

THE SECRETS OF APOLLOS'S SUCCESSES

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Introduction

I would never have used the words “The Secrets” in the title of this presentation if others had not used them in referring to some research I conducted in NASA 52 years ago. Let’s slip back in time to 1967 when I was a mere 33 years old and conducting research on organizational communication at NASA’s Marshall Space Flight Center while the Research and Development of Saturn, the Moon Rocket was entering the final, crucial stages. I was appointed to the role of Summer Faculty Consultant in Communication to the Director of MSFC, the rocket genius Dr. Wernher von Braun. It was amazing because I was one of the first persons to receive a Ph.D. degree in this brand new field of Organizational Communication. I got the job because the Director of my doctoral dissertation, Dr. W. Charles Redding of Purdue University, was the founder of this academic field and recommended me for the job. I was told that I was the first “soft scientist” to be appointed as Summer Faculty Consultant.

Director von Braun asked me to do in-depth interviews with the top 50 managers in the two main divisions of the Center, Research and Development, R&DO, Industrial Operations, IO, and some staff offices. He wanted me to find out which of his communication practices, in his words, “worked well, and which ones did not.” My first question in each interview was “What communication practice works well?” Nearly everyone I interviewed immediately said: “The Monday Notes.” The name suggested a kind of simplicity, but after I understood all of the ramifications, I came to think of it as the most positively powerful communication practice I had learned about. That belief remains today. In fact, there turned out to be three special practices of Communication

Monday Notes

While directing the Marshall Space Flight Center in Huntsville, Alabama, von Braun had dispatched one of his German colleagues to the launch site in Cape Canaveral, Florida, now the

Kennedy Space Center. He missed hearing from him, so he asked for a weekly note. Enjoying and learning from it, he decided to ask the top 24 managers in in R&DO and IO to send him a one-page note on Monday morning. Simplicity was the key: write only about problems encountered and problems solved in the previous six days.

[Org Chart about here]

There were no standardized forms approved by NASA Headquarters to fill out, just write your name and the date at the top of the page. The content was about problems discovered or being worked on, and solutions found to earlier problems reported. They skipped a layer on the way up the organization chart, bypassing the Directors of R&DO and IO. After all 24 Notes arrived at von Braun's office he read them as a bundle, printing the initial "B" in the upper right-hand corner of each page after he read it. (While I was looking at the first bunch the professor in me was disappointed when I started flipping through them and found no "A" papers.) At important points he would write comments in the margin. I saw that he wrote "Congrats!" in a margin next to a problem solved. Other remarks might say, "Get together with the Director of Astrionics Lab on this."

After making his comments he had copies made of all 24 notes and sent back to the writers. The people I interviewed said it was the "most avidly read document at the Marshall Center." What could be more important than feedback from the boss about what we all did last week? Let me try to list the benefits.

1. The Boss was kept informed. Dr. von Braun amazed everyone in the organization and above; he was the best informed Director in NASA, no doubt the best in the whole organization. Before sending me off to do the interviews von Braun told me his job was like "being in the earthquake prediction business," that he had placed "sensors" located in key spots in the organization and then learned how to "read them." Upward communication is vital to complex and first-of-its-kind of work. Testing and redundancy combined to make Braun's epistemological criteria, his operational definition of truth.
2. The people in the trenches, the labs and offices, the "sensors," got feedback from the Boss once a week. A visit to a lab or office by von Braun was a major event, but they were limited by the time available. The Monday Notes involved every unit every week.
3. Third was a combination of personalized and simple medium. The Monday Notes, as one manager put it, were an "antidote to the sterile, code-numbered" and formalized documents; the Monday Notes had your name and the Director's initial.
4. At that point in time the Director was constantly on the wing visiting NASA Headquarters, Cape Canaveral, other NASA centers seeking him in part because of his celebrity status and because he was so well informed. The Monday Notes *kept the local channels open* no matter what demands on Dr. von Braun's time took him away from meetings on the Center.
5. A fifth major benefit was an all-important stimulation of lateral or horizontal function. There was a feeling of competition among the labs and offices that made them careful about opening up to rivals during daily operations, but in the Monday Notes everyone got to see what everybody else told the boss about the week gone by—and what he said about

those messages. While interviewing a manager about horizontal communication he said, “I got the word in today’s notes that I need to talk to the Director of another lab about a specific problem.”

6. Surprising me was a characteristic of the Notes that the participants praised: their “frankness.” As one interviewee put it, that quality gave the Notes a sort of “charm.”
7. Everyone knew there was a communication discipline within MSFC because of the Monday Notes, but no one appreciated the fullness of it until I conducted a follow-up interview study the following summer, 1968. Dr. von Braun and I agreed that I would dip deeper in the hierarchy by interviewing managers beneath the level of Directors. I knew that most of the Lab and Office Directors asked for a Friday Note from their Division Chiefs. When I asked them how they came up with the content of their notes, most said they got a Thursday Note from their subordinates: Ergo, once a week at NASA’s Marshall Space Flight Center, nearly everyone stopped to think about what the Boss should know about their problems and solutions. That is communication discipline.

Automatic Responsibility

There was another special communication practice that opened the power of the Monday Notes to everyone on the Center. It was called Automatic Responsibility, the most powerful antidote to the cautious, self-protective motive in most bureaucracies. The terms of the policy dictated that the at the moment you detected a problem in the R&D of the Saturn, you assumed responsibility for *solving* it and *reporting* it up the line.

Penetration

A third special practice that amazed me was called Penetration. The manufacturing of the Saturn was done by independent contractors. Because of von Braun’s genius and sensitivity to communication problems, he made his own engineers available to visit those contractors. They watched the more-highly paid workers do their job, and questioned them about the work. They were alert to detecting problems and their contractor counterparts were more willing to talk to these NASA experts about their problems than they were to send bad news up the company line. This led to a dramatic scene in which a contractor’s managers delivered the first Second Stage of Saturn, and then they denied there were any cracks in it.

The MSFC recipients insisted that there were some. Finally, the contractor acknowledged there were some. Aha, how many. They gave a number. The buyers came up with a larger number. Now the contractor was adamant.

“Well, then, let us X-Ray the stage.”

The X-Ray proved that the MSFC buyers knew better than the sellers about number of cracks in the Second Stage. This incident should prove to anyone the power of penetration. I more fully understood a dramatic scene I had read about a Congressional Hearing in which von Braun was asked why contractors did much better work for his organization than for, say, the Air Force or Navy. Director von Braun said he could explain it in a word: “Penetration.”

Penetration, it must be emphasized, was based on the premise that the contractor had the *burden of proof*. They had to convince the MSFC engineers that it was going to work before they would buy it.

I waited for nearly a decade before I published my research findings and recommendations in two issues of an academic journal in my field: *Communication Monographs*. I also used my experiences within MSFC to develop a research program in Organizational Identification and Concertive Control (Tompkins, 2015). Friends and colleagues threw a party for me the night Neil Armstrong landed on the Moon. Like the other 7,200 workers, I was so identified with MSFC and proud of its achievements that I had long since expressed the belief that “WE” would make it to the Moon and safely back. After that event I was “WE made it!”

Then came the Space Shuttle. I was worried about it because I heard a lot of talk about it in my second summer as Faculty Consultant because most people wanted to know what MSFC would do after the Saturn was completely operational. Dr. von Braun told me in conversation that we should never put a human being on a rocket powered by solid fuels. Why? Because you can neither test it nor turn it off once you ignite it.

I must pause here to amplify my claim about von Braun’s epistemology or way to the truth was by *testing*. He also believed in redundancy. He might receive several reports in the Monday Notes about an important test, e.g., Astrionics Lab and Test Lab. He had an international reputation for testing; NASA HQ thought he did too much of it. But here he was explaining to me that you could not test the solid-fuel booster for the Shuttle. Nor could you turn it off.

But we did put people on *Challenger*, including a teacher. I heard the news while walking across the Purdue University campus. It happened in 1986 but I had not worked on it directly for several years. Then I interviewed 16 key managers at the Marshall Center about it. I was preparing an article when a book publisher persuaded me to do it for him: *Organizational Communication Imperatives: Lessons of the Space Program* (Tompkins, 1993). In it I reviewed my previous research, mentioning the communication problems as well as those practices that worked well.

In my visit to MSFC for the interviews I learned the details of how von Braun had been kicked upstairs to Headquarters and a meaningless job from which he promptly resigned. His German colleagues were pushed out of the organization and into retirement. I knew some of the new leaders of MSFC and I called them up and said I would like to fly to Huntsville to interview 16 managers, mainly in R&DO. They agreed and I conducted my interviews which along with information in the press about the accident allowed me to advance the hypothesis that the accident was caused by “Organizational Forgetting.” The Monday Notes were now on email, there were no marginal comments by the Boss. I heard nothing about Automatic Responsibility and Penetration had been *reversed*! On the night before the launch of Challenger the contractor’s representative, Roger Boisjoly, could not recommend a launch because the O-Rings had not been tested at the low temperature predicted for the launch. He was asked by an MSFC representative to prove that it would not fly, a complete reversal of the burden of proof.

My book was used as a textbook in Communication classes and I thought I was done with the subject. About nine years later, however, I got a phone call in our retirement home, a loft in downtown Denver. The man said his name was Stephen Johnson, that he had read my book about Apollo and Challenger. He said he was finishing up a book with this title: *The Secret of Apollo: Systems Management in American and European Space Programs*.

He tried to get me to agree with him that Systems Management had made it all possible. He failed to persuade me but I wished him well. He sent me a copy of the book when it came out in 2002, published by the Johns Hopkins University Press. I checked the index and found a reference to me, forgot to read it and glossed over the book and set it aside. I did not think about it again until the last year or so and I was cruising along the web and found a review of *The Secret of Apollo* in a video on my computer. I cannot document it because it was over and gone when I realized what was happening.

The man on camera, perhaps from a podcast, was talking about *The Secret* and used some of the jargon of Systems Theory. Then came the dramatic moment in which he faced the camera and said: “The secret of Apollo is the Monday Notes.” I was stunned. The man in the podcast was, it seemed to me, *panning* the book by praising the Monday Notes. I could not help picturing Johnson listening to what I had just heard, and thinking—that is a stab in the back. He is giving credit to Organizational Communication rather than Systems Management.

It was not until I started to work on this paper that I came to a fuller understanding of what happened. The man hailing the Monday Notes thought he was giving Johnson a rave review because he explained my research on the Monday Notes!

I reopened the book and found this block quote that Johnson uses to introduce me and my work to his readers:

By the summer of 1968, von Braun recognized that he needed to strengthen Systems Engineering at MSFC. He called in Philip [sic] Tompkins, a communications expert from Wayne State University, to study MSFC’s organization and recommend how better to recommend systems engineering (Johnson, p. 150).

Let me point out the errors in this pair of sentences. First, I was called in for the first time in the summer of 1967, not 1968. Second, he misspelled my first name. Third, I was not called in to study MSFC’s organization and how better to “recommend systems engineering.” It is now clear to me that Johnson, consciously or not, sought to adopt communication and claim it as a part of the Systems approach.

The first I heard from NASA was when I was called on the telephone by Walter Wiesman in 1966. Mr. Wiesman was the first person in the history of the U.S. government to hold the title Coordinator of Internal Communication. The youngest of the Germans brought over in

Operation Paperclip, Wiesman later told me that they were looking for someone specifically specializing in Organizational Communication. They recognized Professor W. Charles Redding of Purdue University as the world's top authority in this field. Redding was my academic adviser and dissertation director. He recommended me to Wiesman. The only words I heard about the Systems approach was in my research interviews, a controversy about whether or not NASA-MSFC needed more emphasis on Systems Engineering. I was told that von Braun was the best systems engineer in NASA.

On pp. 121-122 Johnson discusses the Monday Notes and Automatic Responsibility. Although his paraphrase of my work cites my book, the text does not mention me or my 1967 study that produced a description and analysis of these brilliant, special communication practices. A reader, therefore, would come to the conclusion that these are the result of von Braun's conversion to Systems Engineering. That is how the man on the podcast could identify the Monday Notes as the Secret of Apollo. I now accept his conclusion.

But an afterthought came to me: What does Johnson have to say about *Challenger*? The only reference to it I could find in his book is in a footnote on pp. 275-6. He wrote "The *Challenger* accident occurred during operations, not during R&D. Systems management . . . perhaps never should have been applied to operations."

This acknowledges that Systems theories are of limited value, perhaps should not "have been applied to operations." A communication approach did have to be applied in both R&D and Operations. That is why I had accepted the responsibility of doing communication research on *Challenger*.

But I went back on line to see if I could find reviews of Johnson's book that also took the Monday Notes as part of Systems of Management. This time while surfing I found a review in something called *The Space Review: essays and commentary about the final frontier*. The title was: "Review: The Secret of Apollo" by Eve Lichgarn, October 23, 2006. It is well written and, yes, the Monday Notes have a prominent place, taking up more than half page of a three page essay. It refers to them not as a communication process or practice, but as "system of weekly reporting." The review accepts the Monday Notes as part of the secret. Another reader mistakenly takes the Monday Notes as the heart of Systems Management. This review plus the podcast count for replication, my criterion of truth. (As I was typing the References I noticed that Lichgarn quoted from a new edition of Johnson's book. Johnson, therefore, must not have changes what he said about the Monday Notes.)

And then came *Columbia*.

When word reached me I said *no* to the publisher. I have written enough about NASA. A scholarly golfing partner named Greg Desilet said I had to do it. The publisher of *Communication Imperatives of Organization* said I had to do it. Then while walking down 16th Street, the main drag in Denver, I could see the title in my mind, then the titles of most of the chapters. So I went home, phoned my daughter Emily Tompkins Lewis and told her that I would do it only if she agreed to procure all the documents I needed. She agreed.

The title I chose was *Apollo, Challenger, Columbia: The Decline of the Space Program*. My daughter Emily kept me supplied with documents, e.g., the Report of the Columbia Accident Investigation Board. I came to the same conclusion as in the *Challenger* accident: “Organizational Forgetting.” Forgetting the communication practices that made Apollo one of the great technological and organizational achievements in human history.

With that subtitle I thought *you will never hear from NASA again*. But again I was wrong. The book came out in 2005 and NASA asked me to make a presentation at two international conferences at the Ronald Reagan Center in Washington, D.C. In the first one I taught people von Braun’s practices. In the second one I got theoretical, arguing that many historians held that Euclid’s *Elements* was the foundation of mathematics. I took our copy off the shelf of the Great Books and found that there were no numbers, no equations.

Hmm, how can that be? I kept reading and found that Euclid studied either with Aristotle or a student of Aristotle’s. Aha, my own field of Communication had as its forerunner the field of Speech which was an outgrowth of the first academic discipline in Athens: Rhetoric. There is a book by that name that is believed either to have been written by Aristotle or one of his students. Euclid would have known it, including one of the three major forms of rhetorical “proof”: *Logos*, or logical proof which involved the example (induction), and the enthymeme (deduction). Euclid made such an airtight case with his *logos* and diagrams that others saw the possibility of equations.

Apollo, Challenger, Columbia also brought me invitations to speak at universities from Florida to Montana. At that point I lost interest in NASA and concentrated on my job as a volunteer at a homeless shelter in Denver, Colorado: the St. Francis Center. It is a large warehouse converted into a daytime shelter with many, many facilities and services to help homeless people. In my eleventh year as a volunteer another book emerged from my scratch notes and morning pages: *Who is My Neighbor?*

I have volunteered for over twenty years at SFC, but my interests became divided when we felt the approach of the 50th Anniversary of Apollo 11 in 2019. The Denver *Post* printed a Letter to the Editor of mine that I reproduce here.

[Letter about here]

Then I heard from my good friend Omar Swartz, a wise man who has a Ph.D. in Communication from Purdue University and a law degree from Duke University, and is now a professor and administrator at the University of Colorado at Denver. He sent me a call for papers for the Symposium Celebrating the Scientific Legacy of NASA and Apollo. I sent in a proposal and happily received an acceptance letter from Jim Schwartz saying that the selection committee had approved my proposal.

I decided to write a longer paper than I could deliver in twenty minutes and it got me deeper and deeper into the subject. I mentioned that Dr. von Braun’s epistemology was in testing and redundancy, consistent with my long-held belief in *replication* as the way to the truth in the humanities and social science as well as laboratory science.

My thoughts then turned again to Stephen Johnson and his book *The Secret of Apollo*. He inadvertently set up his text so that at least one reader would believe that the Monday Notes developed by Dr. von Braun were the Secret of Apollo. He had hoped he could assume that Organizational Communication could be subsumed under Systems Management Theory. My final objective in this paper is to make a separation of Organizational Communication from Management Theories.

As a graduate student at Purdue I took excellent graduate classes in Sociology. One of them emphasized the work of Max Weber, the German sociologist who developed the Ideal Type of Bureaucracy. The description was not “Ideal” in terms of evaluation or perfection, but as an abstract model with which scholars could compare and report deviations in real organizations. The model would produce a social science of organization, not a handbook on managing bureaucracies.

In my classes in Organizational Communication at Purdue we studied Scientific Management, or “Taylorism,” after the founder Frederick Winslow Taylor. Part of his “Science” was his teaching that a company should only hire “first-class workers” and find the most efficient ways of doing a job in the factory. We also studied the Human Relations approach stimulated by the research of Fritz Roethlisberger and John Dickson. They found that employees treated as people who could talk, listen, and reason increased their production significantly.

Notice that we have different theories about how people should run organizations. Each one is different and tries to correct the deficiencies of the one in vogue. Each is different because of the problems it seeks to improve; each is a rhetorical document trying to persuade Managers and Professors in Business Schools to use and lecture their version of the truth.

Organizational Communication is different from these approaches in that it is *constitutive*. Communication practices are needed to recruit people, to disseminate goals, and is needed to create and maintain an organization with or without a Management Theory to guide it. Organized science and technology must have a communication system. Communication systems can develop new practices to handle unusual work.

Thus, communication transcends management approaches. For this reason I still find the most brilliant and reliable book on organizations and their management to be the one emerging in the Great Depression, in 1938 and reprinted in 1968 by the Harvard University Press: *The Functions of the Executive*, by Chester I. Barnard. He was himself a manager who was invited to profess about his work. He chose to use a functional approach, concentrating on the basic necessities of any organization.

Barnard taught us way back in the Great Depression that “In an exhaustive theory of organization, communication would occupy a central place, because the structure, extensiveness, and scope of an organization are controlled by communication technique” (Barnard, 1968, p. 91). Notice that he did not say an exhaustive theory of “management.”

Communication places the limits on organizations. So do those executives who cannot create new techniques or practices of communication to help their organization succeed. Barnard then

gave us his famous functions of the executive: “first, to provide the system of communication; second, to promote the securing of essential efforts; third, to formulate and define the organizational purpose” (Barnard, 1968, 217). I might express it differently: to provide the channels of communication that make up an organization chart and more channels as needed; second, to recruit people and motivate them to do the needed services; third, to express the purposes and goals of the organization.

Those functions are constitutive: They will need to be done no matter what management theory is adopted by those at the top. Note that this made it possible for Dr. von Braun to create new channels of communication—Monday Notes—in one of the most highly regulated and conservative organizations of our day: the Bureaucracy of a U.S. Government Agency which is defined by the Civil Service Regulations. He adapted the channels of a bureaucracy in order to determine whether or not it had secured the essential services of the people recruited to NASA-MSFC.

My own view still reflects the teachings of my doctoral adviser and founder of the field of organizational communication: W. Charles Redding. He taught that he was seeking more of a social science of organization than of a management. He was explicit in saying that we could not do our work with a “pro-management bias.” By that he thought that our approach was not to assume management was right and the workers were somehow lacking.

One of the important lessons of NASA-Apollo is that Wernher von Braun and his colleagues at MSFC could create new and powerful practices of communication that allowed his government bureaucracy to cope successfully with complexities never managed before.

Several friends read the paper above and made some helpful suggestions. Gregory Desilet, mentioned above, still had praise for the Monday Notes and other practices, but made the point that the management of many of our current industries, e.g., “Big Pharma, Tobacco, Oil and Gas” and others will make unethical decisions that are harmful to their customers and society. Despite these brilliant communication practices “much still seems to depend on the integrity of those at the top.” I must agree.

As an afterthought Gregory reminded me of the two clashing cultures: One with the need for secrecy such as military organizations and the other being MSFC, the need to be completely open. This reminded me of the fact that I had to achieve a security clearance by the FBI before I could step foot on MSFC. I had to show my security badge every time I drove to work those two summers.

Why? We were in a Cold War. Dr. von Braun and his fellow Germans disobeyed orders in order to surrender to Americans rather than to the Soviets. And yet I was told that during my work with NASA some Soviet space engineers broke the U.S. law by meeting with American space engineers in Alabama somewhere off the Space Center. They even gave technical papers to each other.

Another comment about the quality of management during Apollo came from a former student, successful attorney at law, and friend of the family, Michael Lampert of New York City. He

read the earlier draft and began to wonder if the Monday Notes could have worked in the age of the ditto and mimeograph. He would point again to the brilliance of Wernher von Braun in seeing the application of the dry copy machine. I since saw a reference to the first Xerox dry copier in 1959, just eight years before I was doing research on an established communication practice. Enlightened and ethical managers are necessary to the creation and proper application of the most effective communication practices.

References

- Barnard, C. *The Functions of the Executive* (Cambridge, Mass: The Harvard University Press, 1938). (Reprinted in 1968)
- Lichtgarn, E., "Review: *The Secret of Apollo*," October 23, 2006, *The Space Review* (online).
- Johnson, S., *The Secret of Apollo: Systems Management in American And European Space Programs* (Baltimore, MD: The Johns Hopkins University Press). (New edition, 2006).
- Tompkins, P. *Organizational Communication Imperatives: Lessons of The Space Program* (Los Angeles, CA: Roxbury Publishing Company, 1993).

Tompkins, P. *Apollo, Challenger, Columbia: The Decline of the Space Program* (Los Angeles, CA: Roxbury Publishing Company, 2005).

Tompkins, P. *Who is My Neighbor? Communicating and Organizing to End Homelessness* (Boulder, CO: Paradigm Publishers, 2009).

Tompkins, P. *Managing Risk and Complexity through Open Communication and Teamwork* (West Lafayette, IN: Purdue University Press, 2015).