Looking Back

by **Dr. John R. Pierce**, *California Beta '33*

MY PROPOSALS AND WORK LED TO THE launching of the *Echo* passive communication satellite in 1960, which carried voice across the continent, and *Telstar I* in 1962, which sent TV signals across the Atlantic. For this I received the **Charles Stark Draper** *[Massachusetts Beta '22]* prize of the National Academy of Engineering, announced in 1995 and awarded in 1996. My friend **Harold A. Rosen** *[Louisiana Beta '44],* whose synchronous satellite *Syncom* was launched in 1963, also received the Draper prize.

It's been a long time since the launching of the first communication satellites. It's been still longer since I gave a talk proposing communication satellites as a suitable use for space. The talk was given to the Princeton section of the Institute of Radio Engineers on October 14, 1954. That talk was published in the April 1955 issue of *Jet Propulsion*, the journal of the American Rocket Society.

Later, I found that in 1945 Arthur C. Clarke had published in *Wireless World* a paper entitled, "Extraterrestrial Relays," that proposed the use of manned synchronous satellites as radio relay stations for communicating beyond the horizon.

Was Clarke ahead of or behind me? We still don't have manned synchronous satellites, as radio relays, or for any other purpose. We have had lots of forays of man into space, even to landing on the moon and returning safely. And, we do have communication satellites that play important roles in the lives of women and men, including news broadcasts with video from far parts of the world and the knitting together of the host of islands that make up the nation of Indonesia.

Direct exploration and utilization of space began with the launch of satellites. The Soviets launched *Sputnik* on October 14, 1957. We launched *Explorer* on January 1, 1968. A space race was on in two great countries. What was the goal of the race to be? Was it to be something new? No. From the very start the goal was to be the manned exploration of space. Well, a lot of human beings have gone into orbit, and to the moon and back in the realization of old dreams. But new things have happened, too.

What new things has space brought us? I've already mentioned communication satellites and some of the roles they play in our day-to-day lives. I'll add that the commercial technical world makes money in building and launching communication satellites.

An amazing, astounding use of space is worldwide navigation. A yachting friend of mine has a device smaller than a shoebox that tells him where he is to within a few meters, any place in the world. The equipment in orbit is paid for by the U.S. government, but the service it renders is useful to anyone.

Space technology renders other services as well. Spying on things our adversaries would prefer that we don't know about is one such service. A happy variation is producing and correcting maps. What and where are major features of our cities? And, how fare our fields of grain, and our pastures?

In the foregoing brief survey of humanity and space, my chief intent was to show that new ideas and new points of view can be of great value. Many, inside as well as outside our space programs, look on space as the realization of very old ideas of science fiction. They think in terms of man's conquest of space. Yet, satellite communication and navigation are truly new and are of great human value.

Today we live in a bewildering world of competing technologies. In the field of communication, which used to be my field, the services available are various and in some cases conflicting. Will we get our news and entertainment and communication by means of high-capacity fibers that will touch our houses as they criss-cross our cities and towns? Or, will some broad-band broadcasts directly to our homes bring us entertainment and some news and information? And, what about staying in touch while we are away? The number of mobile phone terminals is increasing rapidly, and many are in handbags rather than in cars. Where is all this going, anyway? And, what will it cost us?

In the field of communication, the introduction of the penny post in England in 1840 cut the cost of sending a half-ounce letter from a cheapest rate of fourpence and an average rate of 6 1/4 pence to a single penny, regardless of source or destination. But, the penny post required a monopoly; otherwise cheaper rates for a few special locations would undercut the universally cheap service.

Today we are told that competition must be the way to get good, economical service. Does everyone believe this? Is it so? Or, is competition sometimes a breeder of overhead and a labyrinth of almost hidden charges?

I have drawn on my experiences with and conjectures concerning some aspects of communication because, during the 35 years that I worked at Bell Laboratories,

communication was my business. Communication is still important — and very complicated and challenging. So are the other complicated technologies with which those talented young men and women who become members of Tau Beta Pi are involved and will become involved.

In addressing such important young students, it would seem sensible to suggest that they take the cliches of today well into account. It's good to know what potential employers are looking for and to choose in a sensible way from what various people and organizations have to offer.

Yet, it is also sensible to know that things are not always quite what they are painted as being. The ability to see either opportunities or something beyond the common goal or belief leads to valuable discoveries. At one time space was for me a wonderful field of endeavor — a field that could, and did, give us amazing communication satellites. And, later than my time, it became a wonderful technique for navigation. Such unexpected and unplanned benefits of mankind's use of space produced real and substantial benefits. But, for many in our space program, and for many who hear, and use, and read about space, the word space still evokes old and not very productive visions of MAN IN SPACE or MAN CONQUERING SPACE.

I think that such a divergence between dream and reality is not good. And I hope that such confusions don't plague technical fields other than mine.   ⟊
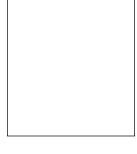

Reference:
The Beginnings of Satellite Communication, J. R. Pierce, with a preface by Arthur C. Clarke, The San Francisco Press, Inc., 255 12th Street. San Francisco, California. Also obtainable from W. Heffner and Sons, Ltd., 3-4 Petty Curry, Cambridge, England.

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Dr. Pierce worked at AT&T Bell Laboratories during 1936-71, was a professor of engineering at Caltech in 1971-80, and was chief technologist at the Jet Propulsion Laboratory in 1980-82. His chief work was in traveling-wave tubes, microwaves, and communications. The Echo I satellite in 1960 embodied his ideas; Telstar, the world's first active communications satellite launched in 1962, was based on his work.

Winner of numerous honorary degrees and national awards, including the National Medal of Science in 1963, the Japan Prize in 1985, and the C. Stark Draper Prize in 1995, Dr. Pierce is a member of Tau Beta Pi and the National Academy of Engineering.

Untitled Leaders *(Continued from page 14.)*

Here are some of the specific behaviors that an untitled leader needs to challenge himself or herself to take on in order to become a true participant in a team:

- Suggest new ideas during brainstorming sessions.
- Stay open to ideas from everyone (no criticism).
- Identify imbalances in team participation and move the team to correct them without harming relationships within the team. (For example: sometimes team members make too many or too few contributions; work in cliques, rather than as a unit; or take problems outside the meeting, rather than resolving them.)
- Identify problems in directing the team and move the team to correct them without harming relationships within the team. (Sometimes there is not enough diversity of input, someone plays "devil's advocate" when it's time to make a decision, or members lack energy or enthusiasm.)
- Ensure that follow-up plans have been committed to in order to keep the team moving forward after the meeting concludes.

Conclusion

A person becomes an untitled leader in nearly every interaction with others, whether he or she is acting as a problem solver one-on-one with a coworker, a facilitator for a meeting of peers, a participant in a meeting, or as an active member in an ongoing team. As we are all working to do more with less and to be more flexible, we need at all times to watch out for the times we need to "lead" and act on them.

So, how do we improve in our roles as untitled leaders? The first step is to be aware of ways that we can improve our interactions with others. The second step is to identify ways to do things better or differently. The goal of this article is to help with these first two; the third step is up to you — to put these skills into actual practice. This is where a lot of training and good intentions fall short; people feel good about their new skills, but they don't take the opportunities to apply them (or know how to apply them) in the "real world." One way to practice is through role-playing situations, where these skills are needed. Practice by yourself, or better yet, with a friend or two. For each of us, situations arise everyday that provide challenging but realistic opportunities to practice. When we see the opportunities coming, we need to think about them, prepare when we can, and make a conscious effort to do things differently!

Best wishes to you in your "new" roles as leaders! ⟊