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# Being Practical About Space

Explorer I, America's first satellite, went into orbit 31 January 1958, just 20 years ago. The American space program, scientific and commercial, has followed at an unprecedented rate. Our record in space has been upbeat all along. Perhaps space shines the brighter when we contrast our success there with the way we founder in a slough of dollars in education, health care, welfare, and other government activities. But space has been remarkably rewarding by any standards, private or public. Why is this? It is because we—the people and our government—have been willing to try new and promising things without any guarantee of success.

In a strictly practical way, this has created and is creating useful things which have never existed before. It is an American technology of building and launching communication satellites that has put remote and undeveloped nations in instant touch with the rest of the world, and that can provide internal communication among the sparsely settled provinces of Canada and the many islands of Indonesia. It is an American technology of surveillance that in part makes SALT agreements meaningful and therefore possible. American satellites easily provide navigational and positional data of hitherto unprecedented accuracy. They show at a glance the paths of hurricanes, the course of the Gulf Stream, the growth of crops, the quality of water in lakes, and the evolution of urbanization. And they will show more.

Communication satellites have had an unqualified technical and *economic* success. Intelsat, the International Telecommunications Satellite Consortium, has a membership of 101 nations, assets of around $400 million, and an annual revenue of around $155 million. It provides about 20,000 half-circuits (one-way) worldwide. Comsat, the manager and American participant, derives over $150 million in annual gross revenues. Other American companies or groups have launched six satellites for domestic communication service, and more will follow. In other satellite applications, economic success may have to wait on the development of a community of users large enough and skilled enough to cash in on new sorts of data.

In all experience, users and needs follow rather than precede innovation. No one is born needing the telephone, and society before 1876 got along very well without it. Once invented and promoted, the telephone became addictive to individuals and nations. A user community grew up. So it was with railroads, automobiles, and airplanes. There was no widespread economic impact until a long course of technological endeavor had demonstrated an addictive capability. With that came economic success.

When new things become as successful as communication satellites have, government funding can be turned to promising new space endeavors. But not everything we try can or should succeed in economic or social terms. The point is, nothing new will succeed unless we try new things, and keep at them long enough to give them a fair chance to change the world.

Some areas of space appear to be reserved perpetually for our government or competing governments. We must continually spend government money to ensure that our launch capabilities keep ahead of those of the rest of the world. Without this, even the most lucrative uses of space will pass into other hands. Adequate government support will also be needed to continue and extend planetary exploration and other radically new space *science*. In stretching so far, it may be a long time before we see a financial return. There are other considerations. Our successes in space science and exploration shine in the world and will shine in history.

If space science, including planetary exploration, is not adequately funded, we will lose an art which, having led us to glory, may lead us much farther. A future without adequate support in this area of great national success would be dismal indeed.—JOHN R. PIERCE, *Department of Electrical Engineering, California Institute of Technology, Pasadena 91125*