

**Dr. Werner von Braun:  
Looking Inward from Space**

*Dr. Werner von Braun was director of the National Aeronautics and Space Administration's Marshall Space Flight Center in Huntsville, Alabama. He addressed The Economic Club of Chicago on Nov. 10, 1966 as two Gemini XII astronauts were preparing to orbit the earth.*

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“Project Apollo, the next step in manned space flight, is already well underway. The Saturn launch vehicle and Apollo spacecraft have been under development about five years. The Saturn I has completed its schedule of ten flights, and three unmanned launches of its successor, the updated Saturn I, have been conducted. The next Saturn vehicle to be launched will carry the three man crew of the Apollo spacecraft into earth orbit...

“Besides providing our scientists with interesting and unusual scientific data, the space program is also beginning to display a highly practical and useful side of its nature. Satellites in earth orbit are providing better worldwide communications, furnishing navigational aids and improving weather predictions. Instead of gazing outward at the stars, these satellites are gazing inward to give us a comprehensive new look at this planet on which we have lived so long.

“From space, the earth itself appears to be a fabulous blue spacecraft spinning at a dizzying speed of 1,000 miles an hour, and racing around the sun at 66,960 miles an hour. It is inhabited by three billion people who are using up its natural resources, polluting the air, and contaminating the water. And this population is doubling today at a frightening rate. The world population doubled only once from the time of Christ until the middle of the 17th century. But it doubled again in the next 200 years, and once again in less than 100 years. At the

current rate of growth, the world's population will double within 35 years. That means from six to seven billion people on earth by the year 2000. If the rate of increase is not reduced, there will soon be standing room only on this planet, and the natural resources will no longer feed the population.

“The look inward from space can provide a means for monitoring the exploding population and dwindling resources, and assisting with a solution to this crucial problem of providing adequate food, clothing and shelter for everyone.

“The U.S. Department of Agriculture is already putting space technology to work to help underdeveloped countries step up lagging food production and to develop their natural resources...

“And the satellites would do more than measure the acreage. They would reveal whether the crops had enough water, or were inadequately fertilized, detect signs of disease, and even indicate the crop maturity and probable yield...

“The U.S. Department of the Interior is also working with NASA on plans for an Earth Resources Observation Satellite, using aerial photography, and such remote sensing devices as radar, infrared and ultra-violet scanners, infrared spectrometers, magnetometers, and passive microwave devices. In addition to geological surveys, the satellites would be useful in the areas of cartography, hydrology, geography, oceanography, and fish and wildlife management...

“Satellites will make it possible to obtain knowledge that could not be obtained by other means, to solve problems that could not be as well solved. It may be possible, for example, to determine rates of reservoir sedimentation, measure the movement of glaciers, measure the effluents of rivers, monitor the levels of lakes and reservoirs, and assess both air and water pollution.

“Even population counts and measurements of daily fluctuations in the traffic flow of both people

and vehicles seem to be within the capability of remote sensing techniques. These earth satellites may also locate underground streams of water to offset the growing consumption of surface water. These underground streams hold many times more water than all known surface rivers. They can also predict the melting of snow for better management of lake and reservoir levels, and observe the presence of plankton which feed the fish in our oceans. The world's fishing fleets could then be directed to the best spots for catches that would help feed hungry mouths throughout the world.

“Wildfires have periodically burned large areas of forests, although public recognition of their terrific toll may not be widespread. For instance, everyone has heard of the Great Chicago Fire that began its historic rampage on October 8, 1871... These same weather conditions existed throughout Wisconsin and Michigan. Fires were started on the same day of the Chicago fire in Peshtigo, Wisconsin and in Michigan. These fires burned largely on forest lands, and covered 4,380,000 acres, with a loss of 1,500 lives. Yet most people have never heard of Peshtigo.

“A spacecraft fire detection system, combined with adequate fire fighting forces, could reduce burned over acreage and save countless lives.

“More than 900 potentially destructive earthquakes occur throughout the world each year. In addition to remote sensing devices, long-range telemetry by use of orbiting satellites would make a significant contribution to programs aimed at earthquake prediction. Such predictions could save hundreds of thousands of lives and billions of dollars...

“The clock of history is running at a rapid pace. Our generation may be the last one that has a choice for meeting this problem. We can foresee the need, and we have the tools and technology for the solution. An international airlines system has been established, in spite of the difficulties of national boundaries and customs. And there is much more at stake in this resources/pollution problem. Everyone in the world has something to

gain, and no one can lose. I believe that we can apply the solution that we have in hand.

“The scientific utility of earth observation satellites, and their potential usefulness for public policy makers and planners, is obvious. We should not overlook, however, their value to businessmen. The information furnished will help farsighted businessmen with marketing of goods and services and with investment decisions...

“In the not too distant future, we may see huge earth orbiting space platforms which will combine the areas of communication, meteorology, and observation of earth's resources. These spacecraft will incorporate instrumentation capable of scanning the full spectrum of radio waves through infrared, the visible ultraviolet, and x-ray portions. They will reveal the full potential of the earth in terms of its agricultural, geological, hydrological and oceanographic resources, and provide the means of communication to disseminate this information to ground stations all over the world. The services of these satellites will bind the nations of the world close together in a united approach on a common problem, the solution of which is essential to the survival of mankind.”

### **Edward H. Levi: The Demands of Citizenship**

*Edward H. Levi was president of The University of Chicago when he addressed The Economic Club of Chicago on February 25, 1970.*

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“As Adam Smith said, ‘There’s a lot of ruin in a nation’. Assuming this means a nation can take it, this resilience may explain our tolerance for the balance within our societies between stability and commotion. We are in a world of considerable lawlessness and chal-