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A BICENTENNIAL AGENDA FOR AMERICA

Bruce T. Lundin

Lewis Research Center
Cleveland, Ohio 44135

Presented at the University of Toledo, Toledo, Ohio
March 21, 1975

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A BICENTENNIAL AGENDA FOR AMERICA

Bruce T. Lundin

Commencement Address Presented at
the University of Toledo
Toledo, Ohio
March 21, 1975

National Aeronautics and Space Administration
Lewis Research Center
Cleveland, Ohio 44135

Bruce T. Lundin

Dr. Bruce T. Lundin graduated from the University of California with a B. S. degree in mechanical engineering in 1942. In 1943 he joined the National Advisory Committee for Aeronautics (NACA) at the Lewis Research Center, where he was initially engaged in improving the performance of World War II aircraft engines. By 1946 he was in charge of the Jet Propulsion Research Section, which conducted some of this country's early research on turbojet engines. In 1952 Dr. Lundin was appointed Chief of the Engine Research Division, where he directed work that contributed significantly to the performance and reliability of today's jet engines.

When NACA became the nucleus of NASA in 1958, Dr. Lundin was appointed an Assistant Director of the Center. In this capacity he directed much of the Center's expanded role in space propulsion and power generation. His duties were widened in 1961 when he was named Associate Director for Development. In 1968 and 1969 Dr. Lundin served in NASA Headquarters, first as Deputy Associate Administrator and then as Acting Associate Administrator for Advanced Research and Technology. In November 1969 he was appointed to his present position as Director of the Lewis Research Center.

Dr. Lundin is a member of Tau Beta Pi and Sigma Xi and a Fellow of the American Institute of Aeronautics and Astronautics, the American Astronautical Society, the Royal Aeronautical Society, and the American Society for Public Administration. In 1965 he received the NASA Medal for Outstanding Leadership; in March 1971, the NASA Public Service Award; and in October 1971, NASA's highest award, the Distinguished Service Medal. In March 1975 he was awarded an honorary doctorate in engineering from the University of Toledo.

A BICENTENNIAL AGENDA FOR AMERICA*

Bruce T. Lundin**

Mr. President, Distinguished Guests, Graduates of the Class of 1975, you do me great honor, for which I am deeply appreciative. To accept this honorary degree and to have the opportunity to come before you at this podium today fills me with a strong sense of gratitude and of responsibility. I am also especially proud to now become, as it were, an alumnus of the University of Toledo - a University that is clearly so well tuned to the future and that has done so much for the professional staff of the Lewis Research Center as we prepare to enter new or expanded fields of work.

As I look out upon this sea of youthful faces, I am sharply reminded of my own graduation from college, just a third of a century ago. Then, as now, the world was a turbulent place and the future uncertain at best. The year was 1942 and fascism was on the march everywhere. Our allies in Western Europe were beaten, we were retreating fast in the Pacific, and both our industry and our military forces were woefully inadequate after a decade of economic depression at home. So, if you feel a twinge or two of uncertainty as you now leave the cloistered halls of academia, I know how you feel. It is as though you have finally reached the end of the board and now must dive in to see if the water is deep and if you can swim after all.

If my departure from college a short 30-odd years ago was to enter an age of conflict, yours, I know, is at least to enter an age of anxiety. With recession and inflation occurring simultaneously, our economic system seems to be beyond our control, if not our ken. We seem to be forever tangled in far off disputes that won't end. And the signs that we may soon be running out of energy, food, and materials are real enough. To solve these problems and control our national destiny without destroying our precious heritage of individual liberties is challenge aplenty.

The pessimists in our crowd have little trouble these days in calling upon the history of the last few decades to find many examples of national weakness and failure. Following our magnificent rebuilding of Europe and Japan after the war, we have again experienced the painful lesson that giving aid wins no friends and buys no influence. We have been noticeably unsuccessful in both exporting our brand of democracy and in effectively using our military force to win our conflicts. And, more recently, our very economic system seems seriously threatened by a cartel of little

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*Commencement address delivered at the University of Toledo, Toledo, Ohio, on the occasion of Dr. Lundin's receiving an honorary doctorate in engineering, March 21, 1975.

**Director, NASA Lewis Research Center, Cleveland, Ohio.

countries whose oil we need. Even the glittering promise of the United Nations to assure a peaceful world is clouded by a multitude of quarrelsome sovereign nations.

I raise these gloomy facts at this time of celebration to make a point. It is simply that in raising these cries of alarm and concern, and usually properly so, we are all too prone to forget our great progress as a society and the very real, indeed, very fundamental, strength from which it all derives.

In the short span of time that I have focused upon - within your lifetime - we have, for example, advanced the cause of civil rights more than in any other period since our country's founding. Great strides, not only a beginning but real progress, have been made in cleaning up and protecting our environment. Surely a strong case can be made for our progress in extending the benefits of a higher education and better health care to greater numbers of our people. We have built a transportation system that provides a degree of mobility to our people and their goods that even those of us in the business could not have dreamed possible 20 or 30 years ago. We have ringed our globe with weather, communication, and earth resource satellites that are returning incalculable benefits to all the people of the world every day. The recent advent of the digital computer and the use of automation is only now promising to lift the burden from the mind of man in a revolution for society as significant as was the industrial revolution in England a century or more ago in lifting the burden from the backs of men. These are but a few items of progress that come easily to mind; certainly the list could be easily extended to the green revolution, synthetic materials, and, I guess, even women's lib.

These items of recent progress derive, of course, from some pretty fundamental and, I believe, enduring national strengths. At the top of the list is our sturdy political system, a system that was very carefully and skillfully structured to assure our individual freedoms and the associated release of the creative energies of our people from all walks of life. What a truly magnificent thing these founding fathers have given us. We are also still a youthful and generous people with an innate desire for usefulness and purpose. And we are indeed blessed as a nation with an abundance of rich resources. Though we may now have to go to the continental shelf or the north slope of Alaska for oil and gas, this is, relatively speaking, no more difficult today than was the drilling for oil in the Teapot Dome of Texas 50 years ago.

With this innate sense of the rightness of progress and our desire for national purpose, we are a people on the move and reaching for the future. Perhaps this is because it has always been so here in America.

From this vantage point of nearing our 200th birthday as a nation, I see three major and connected purposes in our historical past. During the 18th century this purpose was, of course, to create a system of government that would have as its specific and overriding intent the protection of every citizen's individual liberties. This is well known to every high school student. What is less appreciated, I believe, is the fact that this was the first time in human history that a government was specifically, and very consciously, structured to benefit its people and not to serve a nationalistic end, to preserve a monarchy, or to benefit an aristocracy. And so, we started with a good foundation. It was then the task of the 19th century to settle a rich and varied continent. This we did with our rugged individualism, the telegraph,

barbed wire, and the railroad; we thus became not only a nation but a potentially rich one. For the 20th century, for the first half of this present century, the task was to use these riches and the enterprising and generous spirit of a nation of individuals to create and develop a productive system capable of providing both security and affluence for all. With some fits and starts, and some small mistakes along the way, it has been the grandest of human adventures that the world has ever seen.

And here we truly excel today, and here resides our power as a nation: in the development and application of technology to serve the human needs and desires of all our people. Fortunately, the antitechnology wave of the recent past is behind us and we can continue to direct our technological skills to human ends - not for bigger weapons, faster airplanes, or as an end in itself, but to enlarge and enhance all those things that are important to our people - that is, to cleanse our environment, to strengthen our economy, to advance our educational services and medical care, to expand our intellectual growth, to, in short, continue to grow and strengthen all our social and moral values. We are living, I believe, in a time of great meaning and of a real revolution in human progress, a time when the skills of our minds and the talents of our hands can be turned to truly improving the quality of life and broadening our horizons.

Think of all those things and activities that make life interesting and worthwhile and that are the source of your creative freedoms - of increased knowledge, closer communication with other people, of objects of beauty or contemplation, of a heightened awareness of the world in which we live - and you will find that they are the products of the interplay of individuals in a highly technological society.

I am reminded at this point of the experience of a friend who recently called upon a colleague of his, an archaeologist, who had just returned from a 10-day trip to Egypt, Iraq, Iran, Turkey, and Greece. During this short trip, he visited his friends in these lands, inspected various archaeological sites, and collected a few artifacts for his home. In his air-conditioned office at the university, soft music from the stereo filled the room. Adjacent to the set were shelves of tapes of the world's finest music, and a small console was at his desk by which he could obtain nearly any piece of the world's great literature from the university library. A color television set in the corner of the office brought him entertainment, the day's news, or editorial comments on current happenings throughout the world. When asked what he was working on at the moment, for his tape recorder was turned on, this friend of ours said he was preparing an article for a popular literary magazine decrying the unmitigated evils of living in a technologically oriented society.

Yes, we are entering a revolution in human progress, although being in it makes it harder to see, a revolution as profound as was the industrial revolution of the 18th century. It is nothing less than the final joining of all that is moral with all that is material. And you, with the power that you have inherited and with the enlightened values you can bring to the task, have much to contribute.

The years ahead will offer unusual opportunities to use our skills in the development and application of technology both at home and abroad. Throughout the world a rising competition among the industrialized nations for the resources and the markets of the rest of the world will become increasingly a challenge and an oppor-

tunity. This emerging third world, rich in national resources and greatly in need of industrialization to raise the quality of life of its people, now earnestly wants what we have. No longer shut off from the rest of the world, they now see, via communications satellite and our global transportation system, what we have, and now want to enter the 20th century. And they will get it from whomever they can.

Thus our technology is both superior and highly marketable in the world. It is our top card in the global power game. If we are now to use it in the world, if we are now to share it with others - and I would say we must - I am frequently asked at what price. My answer is at the price of peace plus, of course, some reasonably fair economic exchange. To require the price of peace may buy us time to develop a stable world and to provide an opportunity for continued development. This would be using our technological superiority today as, for example, England used her power, principally her Navy, to maintain a balance of power in the world, to develop an empire, and to produce the "Pax Britannia" for nearly a century.

Working in our favor here over the long term is, I believe, the growing unity of the world and its rapidly shrinking social and, in a way, physical dimensions. This growing interrelationship among the countries and cultures of the world is not the result of any action or power of the United Nations but simply the inevitable outcome of the rise of multinational industries; the necessary sharing or trading of resources around the world, and the development of air transport and the communications satellite. By, it may be noted, all these tools of technology.

The rapid development and acceptance of the communications satellite has been most impressive; it is today truly becoming the nervous system of mankind. If any of you have studied the work of our founding fathers through reading their letters to each other, as I have recently, you cannot fail but become impressed with the great handicap imposed upon them by the several months time that was required for an exchange of letters across the ocean. When Benjamin Franklin was our ambassador to France during the war, many times his work was overtaken by events simply because he had no way of knowing. While I'm all for a slower pace on occasion, that is too much.

In dramatic contrast to Dr. Franklin's difficulties was a very ordinary experience I had when down at Cape Canaveral, Florida, a few months ago. Returning to the motel with an associate at the end of the day, I mentioned I wanted to call home before going out to dinner; this reminded my friend that he should also call his office in Tokyo. Sitting down in that motel room at the telephone, he dialed what seemed like 18 or 20 numbers, the phone rang, and his secretary answered. His call was completed more quickly, and I believe was a better connection, than was my call over land line to Cleveland.

Most such communications by satellite today are from point to point on earth, with rather expensive ground sending and receiving stations at each end. We will, however, soon be launching a Communications Technology Satellite in partnership with the Canadians that is of much greater power and that will, therefore, be able to broadcast information to many users with small, low-cost receiving equipment. Information will thus be beamed to individual schools, hospitals, village centers, and even individual homes.

In addition to accomplishing many very important technical advances with this satellite such as opening up a higher frequency region of the spectrum, we will also be conducting a number of what we call "user experiments." In these experiments we will be bringing educational and medical services, as well as cultural material and entertainment, to many people in such remote areas as Appalachia, the Rocky Mountain States, the northern part of Canada, and Alaska. With this single satellite and a number of low-cost receivers, all the medical and cultural benefits that up to now exist only in large urban centers will be made available to millions of people who are now denied these advantages. The possibilities can only be described as exciting. The social consequences of this - for good or evil - will surely be as great as were those of the printing press or the internal combustion engine.

This is but one example, one element, of the total potential of our science and technology. We stand today with capabilities undreamed of 1000 years ago and unforeseen 100 years ago. These are capabilities - and we need them - but they are capabilities in human hands and they must serve human purposes. The glittering promise and the awesome problems of the future come hand in hand, and to deal with both will require men and women who are both highly trained and well educated. Science, its power, and its products have now entered the mainstream of our lives; it is important that the practitioner of this art be not only skilled in his trade but also familiar with the literature, history, arts, and the political and social heritage that form our civilization. Similarly, to the many of you who will enter the non-technical professions or pursuits, I urge that you acquire a general background in the sciences or technology and in what they are doing both because of their intimate involvement in our daily lives and as part of the cultural heritage of every educated person. It is essential, therefore, that we have the wit and understanding to constantly back away from our technology and be able to realize that this technology is building a society for human beings and that it is the kind of people we have that is, in the end, going to determine the use of this power.

With this wit and understanding, we could, in time, be it decades or a century, build a new and better world. Perhaps, by then the rest of the world would be equipped and in a position to use and profit from our unique democratic political system. Perhaps, by then they would have become mature enough and sufficiently affluent to be able to take on the principles of representative self-government. If so, a stable world could be ours.

In the meantime, here at home, and as an example and promise to others, we would have used technology to make our country a good place to live and to enhance our humanness. We would provide for all our citizens not only a stable and secure life in a good environment but also that growth of awareness, the means of human communication and companionship, the joys of an intellectual quest, a sense of our rich history, and those objects of contemplation that are now emerging as a birthright of mankind.

As we move ahead, as I am sure we will, and continue to pursue the values that science and technology offer, we must make certain that we do so with a sure and steady eye on the older values of individual freedom and the dignity of man. The great task ahead, therefore, is to be able to utilize our rapidly growing science and technology and its ever more complex social structure to not only lift the burden from the

backs and minds of men but to also find within this structure a path to a peaceful world and new expressions of man's worth as a spiritual entity possessing creative powers.

And this baton is now being passed to you. With the power and the heritage that you have inherited together with the new values that only you can add to this process I am confident of success. So, in a rather nautical phrase that has long been a favorite of mine, I wish all of you God speed, a fair wind, and a following sea.