

The Business of Science

Winning and Losing in the High-Tech Age



by **Simon Ramo**

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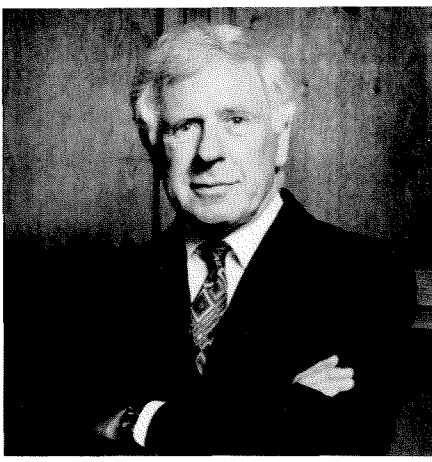
289 pages

Anyone who has had the pleasure of being in Si Ramo's company learns to expect his unique combination of wit and astute analysis. Those who haven't met him have a treat in store in reading *The Business of Science*. It is a hard book to categorize. The author informs us in the prologue that it is not an autobiography, but in the course of the book he tells a good deal about himself. It is about business, but a very special kind of business—that of high-technology military research and development, in which Dr. Ramo does not lack for experience. And he is prepared to apply this experience, without hesitation, to a host of new entrepreneurial endeavors. The book concerns technology much more than it concerns science, and it provides a realistic view of America's technological slip with respect to Japan and, to a lesser extent, to western Europe. Ramo is, nevertheless, optimistic about the possibilities for the utilization of our great scientific strength to regain primacy in technology and to contribute to a better life for all of humankind. There is an explicit blueprint for the next generation of scientifically trained entrepreneurs to follow. And, of course, the book offers a view behind the scenes of an incredible period in world history that the author played an important role in shaping.

Of his early childhood and youth Ramo tells us nothing beyond the fact that he spent his first twenty years (including his four undergraduate years at the University of Utah) in a community of gentle, warm people, and that he had competent, re-

sponsible, and caring teachers. One wishes he had told more about what it was like to grow up as an academically and musically precocious boy in Mormon Salt Lake City. He doesn't tell us how he made the choice of where to go to graduate school, but he had the great good fortune to select the California Institute of Technology, where he earned his PhD in physics and electrical engineering in 1936. From there he went to the General Electric research laboratory in Schenectady, and he alleges that he was hired as much for his talents as a violinist as for those he had demonstrated as a scientist. He left there after World War II to join Hughes Aircraft, having properly foreseen what would be a great growth in military technology related to aircraft and air defense. The description of Si and Dean Wooldridge's separation from Hughes to start Ramo-Wooldridge, and in particular Si's interaction with Howard Hughes, is one of the most fascinating parts of the book.

The new company played a singular role in the creation of the U.S. intercontinental ballistic missile force: it was given the task of system engineering and technical direction of the entire system—not a bad start for a fledgling company. Si gives much credit for the success of the program to Air Force General Bernard Schriever, who had overall responsibility, but this credit must be shared with the remarkable group of scientists and engineers who were attracted by Ramo and Wooldridge. It was almost inevitable that the company would play an important role in the



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evolving NASA space program. Ramo expresses regret over the circumstances that prevented him from voicing his concerns about the manned space program and, at a later time but for similar reasons, the Space Shuttle. He is highly critical of the present lack of a coherent plan for space science and planetary exploration and the failure to provide an adequate expendable launcher capability to back up the Shuttle.

Si has long been involved in trying to rebuild the White House science advisory apparatus, which was destroyed by Mr. Nixon. To my surprise, he identifies Nelson Rockefeller as a principal ally in this effort. (In my own dealings with him, Rockefeller seemed to think Edward Teller was the only scientist worth talking to.) Si's efforts with Rockefeller and with then-President Ford resulted in Congress establishing the Office of Science and Technology Policy in the Executive Office of the President, thus protecting it from the wrath of some future president. Si was offered the position of science adviser to the president by Gerald Ford but declined; he felt that his long association with TRW would worry the bureaucracy and the Congress. Si continued his efforts to improve science advising at the start of the Carter administration and played an important role in the appointment of Frank Press. He struggled heroically with the incoming Reagan administration, trying to motivate them to increase the role of the OSTP and the science adviser so that someone of genuine stature could be attracted to the job. He

failed, as we all know, and over the past eight years the influence of the science adviser has steadily declined.

Nowhere was this more evident than in connection with Mr. Reagan's famous speech of March 23, 1983, which initiated the Strategic Defense Initiative, a concept that had received virtually no critical analysis by even the minuscule advisory apparatus then in existence. The science adviser and the principal technical people in the Pentagon had no input until the last moment. Si has spent a great deal of time trying to put some order into the ill-conceived and chaotic program that developed after the Reagan speech, a program that is hopelessly far away from demonstrating any promise of being able to achieve the president's dream of "rendering nuclear weapons impotent and obsolete." As might be expected, Si understands perfectly well and explains that the deployment of a ballistic missile defense makes no sense, given the current levels of strategic nuclear missiles, or in an environment where the offensive forces are not constrained by serious verifiable treaties. This portion of the book should be carefully read by both of the current presidential candidates.

The candidates would also be well advised to study the analysis of the decline of U.S. leadership in technology, and of course, with Si Ramo speaking, there is a cure for the malady. This is Si at his best. Even though you may quarrel over some points, you cannot help being swept up by his imagination and creativity. Those of you who have had the

privilege of knowing him can hear his voice in these pages. I have to confess that at a certain point I became very uneasy about the technical fix that was being offered for all the world's problems. But on the last page he says what was for me critically missing from what had preceded. I can do no better than to use his own words: "The business of science and technology is to discover the secrets of the universe and apply scientific and engineering skill to yield us security, prosperity, health, and happiness. Yet science and technology can never be more than tools. Poverty, disease, starvation, crime, overpopulation, ignorance, wars, and the impairment of the environment cannot be cured by science alone. That requires parallel social advance. The world's most serious unresolved issues are not science-technology ones; they are social, economic and political. . . . Whatever we ultimately are able to do to elevate the society will occur earlier and with greater success if our science-and-technology tools are many, sharp, versatile, and effective. Wise application of science and technology should offer a life that is steadily better as we progress, more slowly than we would like, toward one that is best." Well said, Si!

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