The business of research

RCA and the VideoDisc

MARGARET B. W. GRAHAM

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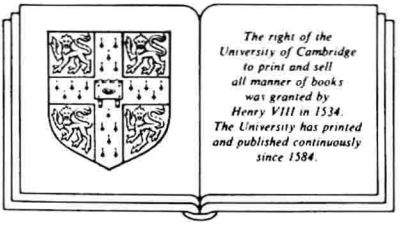

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STUDIES IN ECONOMIC HISTORY AND POLICY
THE UNITED STATES IN THE TWENTIETH CENTURY

The business of research: RCA and the VideoDisc

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TO FLOYD, HARRY, EVERETT, DICK, AND LOU –
A PRIDE OF MENTORS

Editors' preface

American business has been on an economic and political roller coaster in the years since World War II. Although business emerged from the war triumphant and profitable, the adjustment to a peacetime economy was conflict-ridden and painful for many American corporations. But then, in the 1950s and 1960s, the nation's businesses were so successful at home and abroad that they prompted discussion of the American Century, a century in which this country's efficient giant enterprises would dominate the world economy. Other nations would, it seemed, be forced to master American business techniques and organizational modes if they were to remain competitive. By the late sixties some doubts about this prophecy were beginning to emerge. In the seventies intense international competition, inflation, the energy crisis, and labor problems crushed the dreams of dominance and left Americans uncertain about the future of their business system.

It is in this setting that Margaret Graham places her penetrating analysis of *The Business of Research: RCA and the VideoDisc*. One of the key elements in American business success has been the mastery of modern science-based technology. One of the salient aspects of the business system's recent time of troubles has been competition from foreign firms that have frequently bested U.S. corporations in technological innovation. Graham's book helps the reader understand this transition and the complex problems of managing research and development in a corporate setting.

RCA, as Graham shows, was for many decades a remarkably successful, high-tech business. Under the leadership of David Sarnoff, the relationship between the research and develop-

ment organizations and the rest of the corporation was managed with great skill. When, for a variety of reasons that Graham describes, that managerial task was no longer performed successfully, the firm experienced serious problems in translating sophisticated technological concepts into profitable products. The VideoDisc experience was symptomatic of those problems, and the author uses that episode in the corporation's history to provide us with the best analysis we have read of the contemporary "business of research." We are delighted to add this innovative volume to the series *Studies in Economic History and Policy: The United States in the Twentieth Century.*

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Carolina

Preface and acknowledgments

The project out of which this book grew began in 1976 at the Harvard Graduate School of Business Administration. It was an exercise in a type of applied history that was rare then, but has since become far more common. Professor Richard Rosenbloom, the David Sarnoff Professor and then Director of Research at the Harvard Business School, took advantage of a rare opportunity to investigate a major consumer electronics project still under development at RCA. VideoDisc was then wrongly believed to be at the point of final transfer from RCA's corporate research laboratory in Princeton to two RCA consumer divisions, Consumer Electronics and Records, in Indianapolis. In the belief that there would be value in studying a science-based innovation for which the outcomes were still uncertain, Rosenbloom arranged to document the experience at the time. That way, the learning could not later be distorted by participants' natural tendencies to revise their memories to explain the ultimate success or failure of the project.

When I joined the project with newly completed degrees in history and business, our objective was simply to get as accurate an idea as possible of the various nontechnical considerations that helped to shape VideoDisc technology. Our original intention was to produce a teaching case or two, perhaps an article.

It took much negotiation and persuasion to convince all interested parties at RCA that our research intentions were honorable. Corporate executives are naturally fearful of allowing academic researchers to observe their work in "real time." On the other hand, scholars must always be wary of an organization's tendency to want to control or influence their

interpretation of the facts. Both sides are anxious that the facts themselves not be misrepresented, but what "the facts" are is open to debate. For the VideoDisc project a format was devised that, although complicated and time consuming, satisfied both parties. On the basis of open and candid access to all present and former participants and company documents that could be located, I prepared a factual narrative of the VideoDisc project from its inception through 1975. The company had the right to review and correct the narrative itself, and all parties quoted therein were given the chance to correct, and comment on, what was said. The corrected factual narrative, entitled "RCA's VideoDisc: Technical Development and Business Development," is located in the archives of Harvard's Baker Library. It serves as the major source document for Chapters 4 through 8 of this book, as well as for interpretive material that others will publish.

From 1976 to 1978, I consulted every available document collection concerning videoplayer research at RCA that I could find, both at the company and in private hands, from laboratory logs and departmental file collections to personal files and even some extensive unpublished memoirs. I also interviewed more than forty people who either worked for RCA or had worked for the company in the past, all of whom had played a role in some phase of the VideoDisc or related videoplayer projects. A list of those interviewed appears in the Appendix. Some were researchers, development engineers, planning staff, project administrators, senior executives, and industry observers or even RCA's competitors. They were located at corporate headquarters (30 Rockefeller Center, New York), at the David Sarnoff Research Center in Princeton, New Jersey, at any of several RCA divisions and offices from Los Angeles, California, to Burlington, Massachusetts, and at other companies. All these people gave generously of their time to speak with me, and many went far beyond to furnish more documents, to write letters, and later to comment on drafts of the narrative.

It soon became clear that the questions under study required more than a case or an article to treat them properly. Cases focus on one or two key decisions, and articles are limited to a

few themes, but VideoDisc could not be treated as just a sequence of individual decisions or isolated episodes. It took form out of the fabric of RCA corporate life. From a simple account of the VideoDisc project, my work expanded to a monograph covering the entire innovation as an outgrowth of earlier innovations, and treating the RCA company context as a critical determinant of the technology.

The scope of the project expanded several times as I encountered different groups of participants. When interviewing at the RCA Laboratories, for instance, I discovered that several researchers from two predecessor projects, Holotape and Phototape, were still at work on ideas derived from their videoplayer work, now directed at different product objectives. Some remained convinced that their alternative technical approaches would have been preferable to the one that had been selected for development, and these rejected alternatives became part of the story.

I redefined the project again at the consumer divisions, for these organizations had only recently lost out in their effort to induce RCA to adopt a proprietary magnetic tape videoplayer as RCA's main videoplayer project. It was obvious that the consumer divisions had a different philosophy concerning technically based product innovation from that of the Laboratories, one that stressed incremental technical developments carried out by advanced development groups. Many of the engineers who had been involved with Selectavision Magtape, as RCA's magnetic videotape recorder project was called, had been reassigned to work on the VideoDisc, only recently introduced out of the research center at Princeton. The decision had been imposed on them by corporate headquarters, and they had yet to be converted to the new cause. Here again, it was apparent that losing projects had affected the course of the VideoDisc innovation in countless ways and could not be dismissed, although history written after the project had concluded might well have ignored them as dead ends.

Outside competition had also played an important role in influencing both the direction of research and the course of business planning for the VideoDisc project. Key project turning points could be classified according to the foremost

competitors that influenced RCA managers at the time they occurred: CBS, Teldec, Philips-MCA, Sony, JVC, and Matsushita, to name only the most important, had all made their mark on RCA's videoplayer projects, most of them long before their own products had even entered the marketplace. When the scope of the project threatened to include the whole international electronics industry, Richard Rosenbloom and I divided the project. He took the emerging videoplayer industry as the focus of his work, while I concentrated on the videoplayer innovation at RCA alone.

A new set of questions arose when I began to write the narrative. When I asked why RCA had pursued VideoDisc, the stock answer was always that the consumer electronics industry needed an act to follow television. But why RCA? And why a videoplayer rather than some other product? Why not another acquisition to accompany the string of acquisitions RCA was making during the later 1960s? When I pushed for more illuminating explanations, my informants would launch into stories about RCA of the previous era. Even executives who had been at RCA only for a few years explained current events in terms of past history. They told of mistakes that had been made with previous products, of the way things were managed at RCA under David Sarnoff, of successes that showed RCA's former greatness. But while company history obviously contained explanatory power, the links with the past were not obvious. I learned that David Sarnoff, RCA's leader for more than four decades, had done his best to control, and in some instances even to create, the history that had been written about him and about the company. History had mattered so much to him that he had devoted a substantial part of his later career to building the image of himself that he wanted preserved at his own memorial library at the RCA Laboratories. It was in pursuit of more objective historical explanations, therefore, that I assembled, from public sources, internal documents, and interviews with RCA veterans, the history of RCA and its research traditions that form Chapters 2 and 3 of this book. For the first time, I learned why the Laboratories that I knew as a low-key, friendly place filled with RCA loyalists had sometimes been mistrusted and resented by people in

other parts of the corporation, why David Sarnoff's style of managing innovation was mentioned whenever people discussed the management of contemporary projects, and why the television experience of the 1950s still seemed so often to be used as a yardstick when evaluating current new products.

As Chapters 9 and 10 of the book indicate, the VideoDisc project took far longer than anyone had expected to reach the marketplace. Although I updated the research to 1977, I was not able to do the extensive interviewing and document research for the final phases of the project that I had done for earlier phases. The account of the ultimate launching of the project and of what happened when VideoDisc reached the market is therefore based largely on key interviews and on published sources. Again, the facts have been checked for accuracy with the same executives who reviewed the principal narrative. For this piece as for all earlier sections of the book, the interpretation, right or wrong, is wholly my own.

Any book project that takes nearly ten years to complete is likely to have involved many people, if only to encourage and strengthen the author in what sometimes seems an interminable process. For this book I am indebted to the Research Division of the Harvard Graduate School of Business Administration for providing the money and release time to support an expensive kind of work and to a large group of people who helped in so many ways that a chapter could be devoted to their efforts. I owe special thanks first to Richard Rosenbloom, who suggested that I write the book to begin with, and who acted as sponsor, hardworking critic, and friend throughout the entire process. As the list of interviews indicates, numerous people connected with RCA gave me their cooperation, but I am especially grateful to William Hittinger, William Webster, Richard Sonnenfeldt, Kenneth Bilby, and Phyllis Smith for many hours of reading, discussion, and comment. From their personal commitment to accuracy and fairness and their strong support of the integrity of my project I learned more about the meaning of academic freedom than I ever learned in the academy. From my colleagues at the Winthrop Group, George Smith, David Allen, and Davis Dyer, I received encourage-

ment, many useful suggestions, and a deepened understanding of what it is to do applied history. Thanks are due also to academic colleagues at the Harvard Business School and at the Boston University School of Management, and to fellow members of the Society of the History of Technology, many of whom provided encouragement, read sections of the manuscript, and discussed lines of argument in seminar sessions. Chief among these were William Abernathy, Hugh Aitken, David Allison, Alfred Chandler, Kim Clark, Raymond Corey, Karen Freeze, Mel Horwitch, Jeffrey Miller, Robert Stobaugh, Richard Tedlow, and Abraham Zaleznik. I had the help of skilled and patient editors at several phases of the book's preparation – Max Hall, Kathleen Spivack, Judith Gurney, Frank Smith, and especially Louis Galambos. Finally, I had the encouragement and help of Father Thomas Shaw and other members of the Society of St. John the Evangelist, who gave me the use of their hermitage to write in, and of Susan McWade-Patten, who at several stages did much of the preparation of the manuscript. Without these, and many other friends, who here go unnamed, but whose contribution is no less appreciated, this book would not have come to pass.

Contents

Introduction

This is the story of RCA's VideoDisc, a systems innovation by a company, once an industrial pioneer, that was trying to innovate again after a generation of inactivity.

VideoDisc was in two senses a "systems innovation": its technology was founded on several interdependent science-based products and processes, and the coordinated efforts of several different RCA product divisions were required to bring it to market. Like other innovations that originated as science-based systems – the telephone, radio, television, and more recently, videotex – once the elements were in place, parts of it could be sold as individual products, but no piece of it could exist alone in the marketplace.

An innovation is considered to be science based when either the components that it comprises, or the configuration of the innovation itself, require scientific research to bring them into being. Such innovations are generally dependent on some form of industrial research organization either to generate the missing knowledge or to apply already existing knowledge to the problem raised by the innovative system concept. Many argue, for this reason, that science-based systems innovations can best be carried out in a large corporate setting. Few small companies have the resources, the varied production capabilities, or the necessary technical support required for this type of project. Nor can small companies, however innovative, develop and manufacture the specialized components and materials, or assemble the complicated business relationships, to market technology-based systems. Joint ventures, which sometimes attempt to mount systems innovations by combining the complementary skills and resources of several companies, are

notoriously cumbersome and difficult to coordinate and are rarely flexible enough to bring uncertain projects to completion.

Innovation in large companies

Most of what is known about innovation as a managerial activity accurately reflects the experiences of small companies but is wholly unrepresentative of the experience of most large companies. This is unfortunate, for by far the lion's share of the spending for research and development (R&D) and much innovative activity in the United States is performed in large corporations. How does the process of innovation differ in large companies, and what does it take to manage that process effectively?

The standard notion of the innovation process is that it matches a technical capability to a market need. In a small company, where most successful innovations take place, the match between a technical capability and a market need is undertaken and pushed to completion by an individual entrepreneur. A small company rarely has more than a few novel technical capabilities; it is therefore the role of the small-company entrepreneur to identify and define a market need that his or her enterprise can meet with the technical capabilities at its disposal.

The differences between the small-company version of innovation and what passes under that name in large companies are more than simply matters of scale; they are qualitative in nature. In a large company, particularly a diversified one, many considerations intrude upon the simple act of matching technical capability to a market. The large technology-based and diversified company has manifold technical capabilities, often represented by specialist engineering and research organizations, and it frequently has two or three different technical approaches for any given problem. One reason that large companies have in-house research organizations is to acquire or create technical capabilities not already available within the corporation; often rival parts of the company's technical com-