Book Reviews

An Inquiry into the Management of a Very Large Enterprise

Contracting for Atoms. HAROLD ORLANS. Brookings Institution, Washington, D.C., 1967. 260 pp. $6.

For anyone close to the atomic energy enterprise, Harold Orlans' book will make surprisingly lively and engrossing reading. The title does not convey the broad range of this short but informative book—or, as it is in fact, two and a half books.

The volume has had a disarmingly casual evolution. Extra parts were added and anonymous appendices inserted on matters sometimes distantly related to the subject. The book was undertaken as one of a series of studies on government contracting policy by the Brookings Institution supported by a Carnegie Corporation grant. Hence the title. But the Atomic Energy Commission conducts substantially its entire program of research and development and the management of government-owned nuclear plants and laboratories, civil and military, by means of government contract. Hence an inquiry into "contracting for atoms" rapidly becomes an inquiry into the philosophy, organization, principles, processes, and procedures by which the government runs most of the atomic energy program. So part 1, entitled Contract Policies and Practices, deals with basic matters, such as the way in which the contractual method of operation of the Manhattan District during World War II was inherited by the Commission and thereafter made into a creative instrument in the postwar management of a novel military and civil governmental undertaking. There is discussion of the problems of choosing contractors to operate the major plants and laboratories during the old order of "the chosen few" and during the new order of change and segmentation. The new order is illustrated by the test case of the change of contractors and of segmentation at Hanford. Subsequent chapters are concerned with such issues as which managing contractors should be industrial and which academic, which laboratories should be governmental and which private. A fourth chapter deals with big science and the universities; a fifth, with the multi-program laboratories. Finally, there is one chapter entitled "Contract administration."

All these subjects raise substantial issues of public policy. What characterizes their presentation and analysis in this book is the extensive use of the results of private interviews with AEC officials, contractors, and others knowledgeable about nuclear affairs. And because they were probing, candid interviews on issues arousing differences of opinion and experience, the author succeeded in getting many provocative and penetrating quotations, which he presents without attribution. This may be frustrating to succeeding scholars, but the technique has led to a valuable compilation of viewpoints, often acerbic and often acute. Moreover, Orlans does not succumb to the temptation of becoming a gossip columnist. There are a lot of solid facts and figures and useful charts.

Part 2, entitled "Dramatis personae," is in effect a second book, written because Orlans' colleagues at Brookings, having read part 1, thought a description of the major groups involved would be useful. In his foreword, Orlans modestly says that part 2 does not pretend to be an original contribution to knowledge and that those familiar with the atomic world "may prefer to skip it." To skip it would be a mistake, even though it is only partly concerned with "contracting for atoms." It presents five interesting vignettes—of the Commission itself, of the Joint Committee on Atomic Energy, of the Department of Defense in atomic energy matters, of the nuclear scientists, and of the nuclear industry. Orlans is not always complimentary to the Commission, either about its form of organization or its performance. I suspect he somewhat shares the even less complimentary view expressed by a reader of the draft manuscript (whose comments on it are reproduced in full and anonymously in an appendix inserted in the middle of the book):

> The AEC has subtly accepted the Joint Committee on Atomic Energy as its principal customer and critic and generally has abrogated a major responsibility for leadership. Its principal motivation is to implement the directions of the JCAE in a manner consistent with its historical development and machinery.

I think the comment is obsolete.

Part 3, entitled Final and Further Observations, returns to where part one left off. The opening chapter, "Conclusions and recommendations," is only seven pages long. It is condensed and succinct and could well be used as a discussion paper for a future Commission meeting. Here Orlans suggests that the case for exclusive contracting for research and development and managerial services, while persuasive to date, should be a policy, not a dogma, subject to reexamination five to ten years hence. He asserts that the awarding of operational contracts to companies with private investment in the nuclear industry "renders more likely" problems of conflict of interest. He recommends as a possible alternative to multi-institutional management, which may be self-defeating, a simpler management structure accompanied by a national "convention" which establishes codes governing access to major national facilities. He would fight the "paper jungle." He would support greater allocation of funds to industrial laboratories for power reactor development and the establishment of clearer technical and economic objectives by the Commission.

Orlans faced one problem familiar to inquirers into the current scene. Early in the study he found the management of the reactor development program to be particularly in need of strengthened direction and control. But midway through the study, at the end of '64, the AEC instituted a comprehensive reorganization of the direction of the reactor program. Soon complaints were heard that the AEC was overcontroling and exercising excessive direction. Orlans sensibly concludes that not enough evidence is yet available to decide whether the AEC overcorrected or not.

But the reader is not finished yet. The final chapter opens up a great deal of new territory. It is entitled "Two further issues—the AEC's role in high energy physics and the future mission of the laboratories and the AEC." "We hope," says Orlans, "only to open, not close, discussion of these questions." Among other things, he then asks whether the AEC should not be

entirely dismembered, a view supported "by a surprising number of observers." The book is symptomatic of what often happens to intelligent people when they start studying what appears to be a narrow aspect of the atom. The subject tends to grow.

One "final and further observation" of this reviewer is that the footnotes should not be ignored. They are a great deal more than citations and are often lively extensions of the text.

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Virology

Interferons. N. B. FINTER, Ed. Saunders, Philadelphia, 1966. 358 pp. $15.

The work of the last few years has established beyond doubt the biological significance of nonimmune factors such as interferon in control of infection. Success in using such a mechanism to control virus infection in humans has been elusive, but it seems to be becoming more of a real possibility with the availability of nonviral inducers of interferon production. The group of authorities who have contributed to this volume is well chosen and diversified, presenting information on interferon ranging from its molecular nature and its intimate mechanism of action to its biological significance and the prospects for its use in man. Recent studies with purified materials have allowed new realization of the extremely high biological activity of interferon, its species-specific action on cells, its broad antiviral spectrum, and its lack of effect on the uninfected cell. The results of current investigation seem to agree in indicating that interferon acts at a point somewhere between the transcription and the translation of the viral messenger RNA. Interferon would appear to play a major role in recovery from virus infection, whereas immune defenses prevent reinfection. It can block several species of oncogenic viruses and thereby inhibit the malignant transformation of cells and the development of certain tumors. Thus the information presented in this volume will be of interest to a wide scientific audience.

This is the first volume wholly devoted to this rapidly growing area of animal virology. During the past few years several promising chemical agents, including iododeoxyuridine and *N*-methyl isatin β-thiosemicarbazone, have been developed for the control of certain virus infections in man. Interferon was thought from the time of its discovery to have great promise for this use. At the end of the decade following its discovery it is quite appropriate to assess our progress toward this goal, as well as our progress in understanding of the role of interferon in the cell-virus relationship. The book has a common set of some 600 references at the end, rather than a set with each author's chapter. Instead of the hastily presented and uncoordinated set of papers one often finds in such a volume, this book is well planned and presents an integrated, comprehensive, and authoritative review of the work in the area. Appropriately, the introduction was written by Alick Isaacs, who first recognized interferon in 1957 at the National Institute of Medical Research in London while working with a Swiss colleague, J. Lindemann. Isaacs' recent death saddens all who have followed his creative genius and his quite original contributions to virology. All whose work is described in this volume will readily acknowledge a debt to him for his exciting ideas, always derived from fundamentally simple experiments.

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Optimizers and Computers

Recent Advances in Optimization Techniques. Proceedings of a symposium held in Pittsburgh, April 1965. ABRAHAM LAVI and THOMAS P. VOGL, Eds. Wiley, New York, 1966. 670 pp., illus. $12.50.

The symposium of which this volume is the proceedings was arranged with the object of "providing an opportunity to the practitioners in nonlinear optimization to exchange ideas and to gain familiarity with the concepts and methods of others in different technological areas." In particular, the organizers had as their aim "the breaching of the nomenclature and notation barrier which tends to isolate those who are working on a specific class of problems in a specific field from their counterparts in other areas."

The papers in the volume fall more or less into two basic categories: the optimization of static systems such as nonlinear and integer programing and search techniques; and trajectory optimization, controller synthesis, and performance optimization of dynamic systems with deterministic or stochastic inputs. To comment on the technical contents would require a team of reviewers. Suffice it to note that the reader interested in optimization techniques, especially the computational aspects, will certainly find this a worthwhile reference.

The symposium was successful in that it did bring together workers from the many diverse fields in which optimization problems abound. This very diversity, however—the volume includes papers on control of a space vehicle, on communications systems, and on lens design, for example—may lead some to wonder whether the organizers' aim was not quite impractical. As one attempts to read almost any paper in the volume one is immediately faced with new terminology and peculiar and esoteric notation, and the going can be slow. Strange acronyms pass before the eyes—one sees GROPE, AID, MASS, VARMIT, STEP, LOOK, PARTAN, BEST UNIVAR, SUMT. Have the optimizers compounded the situation by a new and strange terminology? Quite the contrary. It would appear that digital computers (in spite of the strange names of their programs) acting as a catalyst will be the basic means by which optimizers (and others) will be able to communicate. I am sure that all who attended the symposium understood and appreciated (as will readers) A. Leon's paper "A comparison among eight known [sic] optimizing procedures" and other papers describing specific digital computer codes. Optimization implies computation, for the potentialities of numerical techniques cannot be realized without the aid of the computer. One can only hope that the designers of computer programs recognize that their programs are used in many fields and that they can ease the transition between these fields by explicit and complete documentation of their procedures. The establishment of notational and other standards to be used by program designers might be an achievable and worthwhile goal.

The editors have done an excellent job of gathering and arranging the material. The diagrams and figures are many and excellent. A classified bibliography on optimization is included.

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