

**Book Information**

**Title:** The Secret of Apollo - Systems Management in American and European Space Programs

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**Summary, Relevance and Discussion**

Although the title of this book places it on the reading list of those wishing to learn about Project Apollo, the subtitle reflects its actual content. The organization of the book is essentially that of an argumentative essay; the thesis being that the success of an engineering development program is heavily dependent on its management.

Launius has placed this book in the category of Apollo Technology but that categorization seems ill-fitting as the book's emphasis is not on the technology itself but rather the management of technology. As mentioned several times in class, the term "Apollo Project" has become a colloquialism to refer to the concerted efforts of a large number of people and resources to achieve extraordinary results. "The Secret of Apollo" attempts to uncover the organizational mechanisms that lead to this image of Apollo which currently pervades the national consciousness. It must be noted that this is not the first time that such an attempt has been made. Congressional investigations held in the 60s also attempted to uncover the organizational secrets of Apollo for application to other arenas. Johnson has taken a fresh look at the topic through the 20/20 vision of the history of the events that followed as well as the events that preceded Apollo.

The book begins by tracing the early history of how managers in the United States learned to manage large scientific and technical programs. The author chooses to focus on projects and organizations in the space industry as representative of very large technical systems and adopts a crosscutting approach to examine the role of management in the success of these projects. To set the stage for the rest of the book, he identifies various groups involved in engineering development programs and attempts to unearth their needs and motives. He also discusses common "systems"

engineering issues encountered in space projects such as vibration, electromagnetic interference and problems caused by mismatched interfaces.

Each chapter of the book focuses on a specific space-related project or organization and its approach to the management of technology, major technical and/or organizational problems it encountered and its path to adopting system management techniques. The Apollo Project is but one example investigated in the book, the others being the U.S. Air Force Atlas missile program, the Jet Propulsion Laboratory's rocket and spacecraft programs, as well as the European launcher and spacecraft development programs.

In the first half of the book, the author identifies the US Air Force as the originator of core techniques of system engineering and management including configuration control for its missile development programs and as the major force in their dissemination to the aerospace industry through its procurement regulations. He then delves into painstaking detail, to further follow the spread of these techniques to JPL and NASA through both direct and indirect paths.

The second half of the book focuses on the history of European space programs and their incorporation of American management techniques. It compares the management structures of the European Launcher Development Organization (ELDO) and the European Space Research Organization (ESRO) and relates them to the success of the organization. It traces the failures of all the hardware developed by the ELDO to poor system management resulting from lack of central financial and contractual authority, as well as poor communication between the various stakeholders. By contrast, spacecraft developed by the ESRO functioned extremely well due to an organized planning approach as well as oversight and assistance provided by NASA to aid in the adoption of American system management techniques.

The creation of a European Launcher Development Organization (ELDO) is one of the most interesting decisions discussed in the book. The idea originated with the British as both a political and financial maneuver to gain access to the European Common Market through offering superfluous rocket technology to other countries. The motivations of the other countries involved in the program were more mixed; a combination of an opportunity to gain rocket technology without full scale in-house

development as well as to spark a “technological revolution” to enhance the country’s image on the world stage. The situation illustrates a very interesting interplay between political and technical considerations. For the British, this purely political gamble paid off initially due to the technological limitations faced by other countries. However, all countries lost in the subsequent failures of the integrated launcher, all but one of which originated in communication problems rooted in the political maneuverings of member countries. The national jealousies between the ELDO countries led to withholding of technical interface information between various entities in the project, inevitably leading to mismatches and failures. The conclusion is that for large-scale projects involving various stakeholders, political and organizational decisions play an extremely important role in technical success or failure.

*The Secret of Apollo* concludes with the lessons learned in system management from the American and European space programs and asserts that system management has survived the test of time due to its incorporation of the viewpoints of the various stakeholders involved. The longevity of this approach is demonstrated by its standardized use in the modern aerospace industry as well as its spread to other successful industries such as software. As a final note, the author compares American system management with comparatively decentralized Japanese management techniques to assert that the American technique is superior due to its effective management of research and development programs, whereas the Japanese technique works well only for mass production industries.

### **Critical Examination of Content and Sources**

"The Secret of Apollo" is a well-organized book that follows the "tell them what you're going to tell them, then tell them, then tell them what you told them" approach to prove its thesis that the success of a technical project depends on how well it is managed. The author chooses space projects to illustrate his point due to his interest in and familiarity with the aerospace industry as one of its members. Before pursuing a career in space history, the author was trained as a physicist and was involved in various systems engineering activities in the aerospace industry. However, his writing does not reveal a technical bias. On the contrary, he delves into the minds of various

groups of people including military officers and managers as well as scientists and engineers during his investigation of the evolution of system management.

On the other hand, the author's comparative approach to the investigation reveals his scientific bent as he traces the linkage between good management and success through various projects and organizations in order to establish its independence from these factors. His comparison of American and European programs is particularly effective. Additionally, the author is extremely thorough in following the issues of a failing project and their resolution through the system management techniques to conclusively prove his thesis. The main weakness of the book is extremely detailed background information about various projects and organizations that obscures the primary topic being discussed.

A professor in his current life, the author is very mindful of the importance of his sources and this book contains an entire essay on the sources, their usefulness and biases and the reasons for using them. Thorough and detailed footnotes are also provided along with a listing of the physical locations of sources.

The author has made extensive use of primary sources such as management techniques specification documents, memos, letters, meeting minutes and status reports. He has also managed to uncover rich materials such as management training manuals. His secondary sources are also powerful; documents such as reports of congressional investigations are thorough sources of information in themselves. In places where he has used sources containing an individual's opinion such as interviews and articles written by people involved in the program, he has checked the claims made against primary sources to filter any biases. In fact, this attention to objectivity is one of the winning features of the book.

Only in some places does the author draw unsubstantiated conclusions e.g. about the motives of different groups of people. In other places, he treats the absence of certain themes in a specific set of sources to draw sweeping conclusions, seemingly without researching other types of sources. An example is the conclusion that management of R&D was not considered important in the post-WWII era, based only on the absence of this theme in management textbooks of that time.

**Conclusion**

To conclude, Johnson makes effective use of comparative analysis and rich data sources to argue the importance of good management for large-scale project such as Apollo. The book is an informative read for someone wishing to learn about the forces that shaped the evolution of system management in the US as well as for technical persons attempting to understand non-technical factors contributing to a project's success.

**Word Count:** 1457 including titles