Book reviews

Space Program Management: Methods and Tools

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Most of the achievements of our modern world came to our lives due to many years of hard work of different people. Working toward innovation, in international cooperation and partnership and working with all-time rising technological risks – attaining these goals was impossible without financial investments in the short and long term. Space activity is one of the most highly technological, innovative and risky spheres of human activity. Governments support space programs and play a main strategic role. Private companies have a narrow band of interest for investments. Therefore, space program management involves methods and tools of management and governance of the space sector.

Space activities have a great influence on the economic, social, military and scientific spheres of a human being. Therefore, space management plays an important role not only in space development, like remote International Space Station, but also in the results of space programs actively involved with the day-to-day activity of a human being.

The space age started from the rivalry of two powers – the USA and USSR. For this onset helped in the important technical development of the Germans. After 1980s, other players – China, India, Japan and Europe – involved themselves in space programs. New participants were supported by US and Russian space agencies. They also had joint space programs and projects.

Space "governance" means military, political and economic decision-making factors which can influence industrial development and scientific research for space activities. Space activities are very important for these countries, because the success of launches and space programs shows independence, defense and the standing of the country in the international arena.

Space activity is highly complex and consists several parallel working systems. Some of them are creating satellites, other rockets. Many people work on ground after the launch, with the information and driving devices in the space. Special attention and quality management are essential for organizing the launch and for the work that follows. Space program management has the same specifics like project management. Generally, all work is categorized into four basic segments: planning, organization, coordinating and control. Actually, space programs have specific characteristics based on the type of the mission. Moreover, because of its size, many technologies are involved in space programs that constitute an industrial group. The management plan includes three factors; the topology must be consistent and should constitute a technical three, a contract three, international cooperation, target contracts, project activities, export and import of space technologies a timetable

plan. All space projects have characteristics such as international size, major investments, long-term realization (2-3 years) and long operations (more than 10 years). A space program is realized when it is physically launched into space and the services or applications for which the mission was defined are used.

Space industry is also a part of the global economy. However, market systems do not influence what space programs will be chosen. For example, the European navigation the system is considered not only as part of the economy, but also has political, strategical and economic contexts.

A space program is a part of an industrial organization called upon for its realization. A typical organization is often based on business lines. They are characterized by the nature of their activities, and the organization is a permanent descriptive element (it rarely changes; that is it changes only if the firm strategy changes). Every space program is a long and expensive project. The size of the team depends on its importance, mission and resources. For example, for a commercial telecommunications satellite, the team is made up of at least 15-20 people. At the same time, if we speak about the large programs such as Galileo, the team can consist of dozens of people. The program team has an essential role in ensuring the right flow of information and in dealing with unforeseen situations such as technical problems or administrative glitches.

There is a very important part of management in a space program – Configuration Management. It aims at maintaining a control document of the technical definition of the system, subsystems and devices of the program. The program team has to produce and maintain an update on all documents that will allow it to have a precise vision of the elements that make up the system. Configuration management has several functions. The first is to identify the documents of specification. Next step is connected with planning. The third step is to control the configuration status.

In the management of space programs, the activity dedicated to tests is fundamental for ensuring the convergence of the program into the originally defined mission requirements. The convergence is expressed through numerical simulation and true physical testing of the program elements, devices and subsystems. All space system is tested and measured at the levels of: elementary components, equipment or devices, subsystems, integrated systems and interface with external elements.

Space activity and, especially, the launch always come with risk. In this connection, there is risk management of space programs, which is expressed through the dual demonstration of “Reliability and Security” requirements during the program development phase and their control during the operation phase. It is a process of planning in which the main aim is to reduce a possible loss through strategies and methods, which minimize risk and develop an appropriate quality standard. These standards can be different according to the mission type. It is evident that human space missions present extremely high requirements and with high levels of redundancy, with respect to a robotic mission.

Finance is a part of risk management and is defined as all the processes planned in time and aimed at reducing the probability of a loss. Like every project, the realization of a space program

requires significant investments in the feasibility study as well for the construction to launch and for the use of orbit. The moment from which investments are engaged for a realization of the mission, they are financially under set risks, which can have a negative or a positive impact.

Space industry is a very specific part of the economy. For the implementation of a space program, it is very important to know the basic elements for economic evaluations. The business plan is a working tool for the process of organization of the space program. The main elements for economic evaluation are: profit analysis, market analysis, risk analysis, development plan, organization plan, quality plan and executive summary.

There are three forms of financing space programs: public, private and public – private co-financing. In "project financing" operations, it is possible to select various categories of financing sources – equity capital, funds which can be assimilated to equity capital and dept capital. In satellite projects, all three financing instruments can be present, even in combination with each other. It depends on the financial plan and the type of investments, which should be analyzed. The proper economic-financial analysis starts from the three sections of macro-phases: construction of the infrastructure, final testing of infrastructure and commercial management.

Small spacecrafts were pioneers in the space history. Nowadays, they are known as low-casters. Also, it is rapidly developing, in as quickly as a month and provides capabilities not possible with large spacecrafts. Any activity involving more than one person requires a management structure. Every member communicates with each other, and the manager is the core of the team. Too often, the realization that success depends on individuals more than on formal standards stands true. The methods to protect from staff change in small programs are different. Small teams reduce resource requirements – both time and money, in many ways. A program budgeted assuming it will be accomplished by a small team will be impossible to execute with a more classically structured approach with work divided within individuals in different departments. The team must include the client because to reach the most economical overall solution, every element of the design must be negotiable in some sense.

One of the good and scaled examples can be the large civil governmental satellite program – The NASA's Advanced Communications Technology Satellite Program. The main concept of this program is a mix of politics and technology. In 1978, because of the President Directive, NASA began the process of rebuilding its R&D activities in the communication satellite arena. This program has a long history, so to speak about space activities. During the implementation of the program, many humans and financial and scientific resources were involved. This space program has given a new step for not only technology and innovation development, but has also brought its contribution to the management of space programs. We should not forget that here the world's space activities are compared.

This book addresses issues of management in the space industry. The author shows programs from different perspectives – from technical to management, making business plans in specific conditions of the space industry.

Subject and approaches in the book are new and actual not only today,

but also for future analysis. In addition to the success of space launches is the face of the country and its prestige in the international arena, so this theme will only grow.

This book is written in plain English and will prove to be an interesting read even for an untrained reader. All terms and specific points are explained by the author with relevant examples.

Many of the examples and evidences given by the author's are backed by illustrations and graphs. The data were taken from official sources and various space agencies. However, it should be noted that the data are only for the USA and the European Union and do not reflect the state of the space industry in Russia, which is one of the major players in the space sector.

There could be a social aspect that emerges after a better disclosure and presentation of the subject. Consequently, the choice of the direction of space programs could also depend on the needs and demands of society.

This book is well structured. Each chapter consists of an introduction and a theoretical part and then provides the basics of engineering/financial/economic foundations. Examples of space programs act as reinforcement. All terms and specific moments are described and supplemented with examples.

The topic of the book is quite specific. The authors have discussed many aspects of a space program. There are studies of the space program, but they see only one or a small number of components. We can say that the author has completed a unique modular analysis.

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Forethought in designing corporate strategy

Frederick Betz
Strategic Thinking: A Comprehensive Guide, Bingley (UK)
Emerald Group Publishing Ltd
xi + 355 p. (with Index), £40.
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A specialist in the management of research, Professor Betz advances a ten-chapter thesis on thinking ahead, ranging from vision and venture to "dishonor" in long-term planning. After a concise preface, in which he introduces his theoretical principles of strategy, he launches into well-constructed chapters to illustrate each functional value.

The chapters of the book are well-conceived and explicit. The vision chapter, for example, begins with a diagrammatic scheme of how decision theory applies:

present status → tactical means → ends & values → outcome.

The chapter continues with a case study, specifically the origins and development of the Sony Corporation (a classical example of innovation beginning from scratch) and of Mitsui & Co., a major trading firm in Japan. Both companies have consistently displayed this vision:

preparation + perception + commitment.

The author stresses the broad outlook and sensitivity of such firms toward competition, ending the chapter with a very brief summary of what has been presented, together with a short list of the chapter's theoretical principles.