

IAF SPACE SYSTEMS SYMPOSIUM (D1)  
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## SYSTEM ENGINEERING CHALLENGES AND TOOLS IN MULTI-PROJECT ENVIRONMENT

### Abstract

System Engineering plays a vital role in system conceptualization, designing, planning, scheduling, execution, controlling the project and delivery of the final product complying to the intended specification. This field encompasses the management of multidisciplinary complex systems over their life cycle and ensures that all likely aspects of a project or system are addressed and subsystems integrated successfully as a whole system. Spacecraft building being a complex technology uses system engineering from conceptualization phase to design and subsequent realization phases. An individual system is easy to be handled or realized when it is confined to a single project, as it is one of its kind. Although complex unique, the whole of the resources are focused on a single entity (project) in this case. With the emergence of the newer applications and exponential rise for the requirement of spacecrafts with quick turn-around/ realization time, accordingly, Project management team needs to gear up to sync with the demand supply chain. As Spacecraft consists of various subsystems, the success of a project depends on the robustness of its design well-defined unambiguous inter-system interfaces. And if multiple projects are to be handled and executed within the stipulated time, in a single organisation, then the scenario is completely a different one. The challenges put forth would impact the domains of Planning, decision analysis, work allocation, resource sharing, addressing of contingency measures etc. Apart from the other factors, the three prime governing factors that aid the execution of multiple projects are the design optimization, standardization of systems and end to end productionisation. This apart, implementation of modular approach at the subsystem as well as system level, helps tremendously in project execution in the multi-project ambience. This paper distils the key factors and challenges associated with System Engineering aspects like Project alignment management, Control and Communication, Learning and knowledge management. It also tends to build a framework that helps to balance all the projects undertaken, effectively, thereby resolving the conflicts that are envisaged in multi-project environment so as to promote the utilization ratios of limited resources. This paper also highlights the applicability of Critical Chain Method (CCM) tool in executing ISRO projects, which also applies the Theory of constraints (unlike PERT CPM), considering the mul-

multiple projects environment. The use of CCM has seen an improved performance with regard to schedule, cost and scope of the project.