

# Application of System Engineering to Project Management: How to View Their Relationship

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## ABSTRACT

System engineering in complex systems has transitioned into a well detailed, universally accepted, client-oriented methodology. Unfortunately, this approach hasn't been adopted in most commercially mandated research and development organizations. This article acknowledges that to improve the success of projects, it is essential to understand the benefits of managing product requirement with system engineering. In discussion is the application of system engineering in improving the success rate through better requirement handling. It presents the elements of the relationship between system engineering and project management. The findings suggest that the full importance of applying system engineering can only be enjoyed if other pre-requisites on prudent decision-making are applied. Furthermore, the findings suggest guidance on ways of adopting system-engineering (SE) practices when implementing in large-scale engineering projects.

## KEYWORDS

Industrial Engineering, Project Management, Projects, System Engineering

## 1. INTRODUCTION

The integration of system engineering and project management has become an increasingly important element in many organizations. The regular adoption and use of modern technology, the change in latency of business processes, and the benefits of system engineering make project management a bittersweet profession. The bitterness is in the technical complexity of the system and management of a time-consuming project. The sweetness is once system engineering is adopted; it facilitates an easy way to successful completion (Montmain et al., 2015; Xue et al., 2014a).

Challenges like a failure in many projects result from an abrupt shift in goals, project misalignment with organizational goals, and leadership problems. References like the Project Management Body of Knowledge published by the PMI defines practices that are entailed in a successful project and provides a guide through the process of integration of project management and system engineering (Galli, 2018). The adoption of system engineering tools and techniques in project management provides a practical sense in executing the development process optimally to produce quality products that meet customer requirements in a shorter span of development time with the shorter input of financial resources (Galli, 2017; Xue et al.; 2014a; Xue et al., 2015b).

There exist several benefits of applying system engineering to any complex projects. These include considering model building in place of guesswork and solving problems through correct procedures by the level of importance (Xue et al., 2015a). In the initial study of the importance of integrating the two, benefits of the application of system engineering in project management were not clear or

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well documented. But in recent times, documentation is in the process of improvements to prove the worthiness of systems engineering. Many informational gaps still exist that will be discussed in this thesis. Some critics claim it is difficult to quantify the rate of return on investment from uses of systems engineering metrics (Xue et al., 2014b).

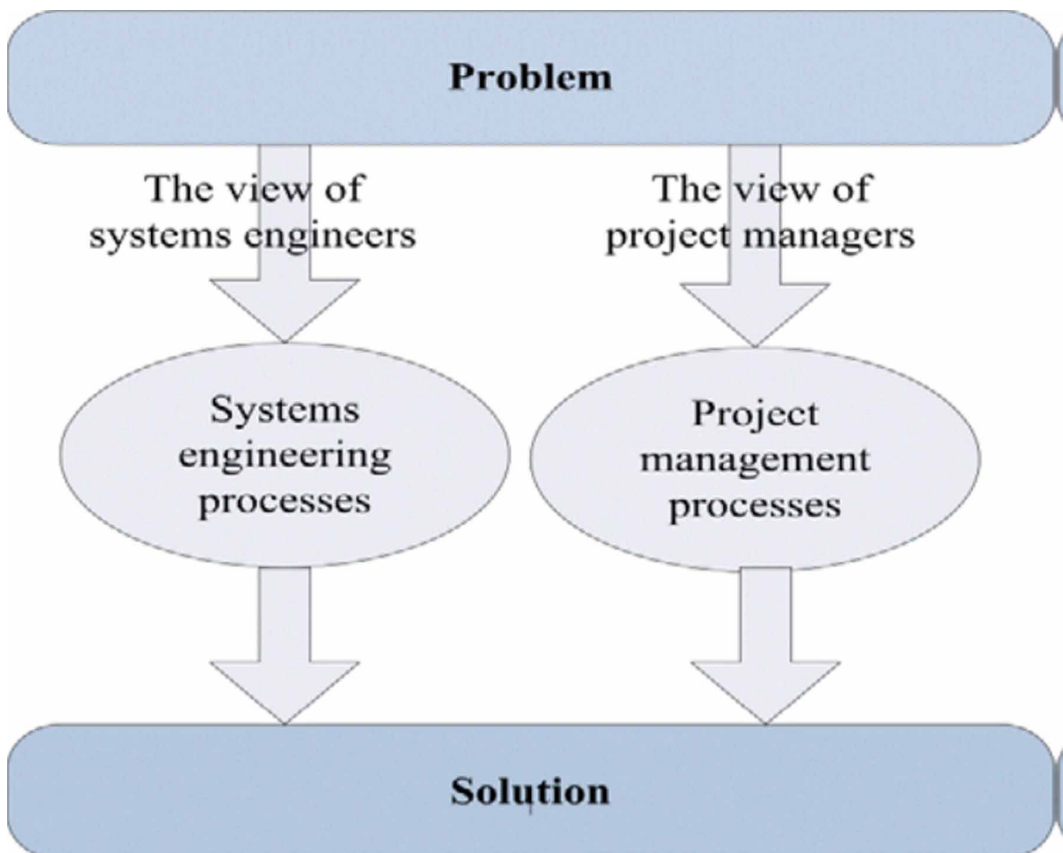
The objective of this paper is to establish a platform for measuring the level of effectiveness of systems engineering techniques as a part of project management. The main objective is to acknowledge the impact system engineering has on project management and appreciate the relationship between the two (Xue et al., 2015c). The interest is to provide optimal solutions in product development, especially in large-scale industrial engineering applications.

In this paper, review of various literature will tackle the topic of system engineering and references that provide standards and guidelines for project management. The paper will also review case studies from previous research to help in arguing the importance of the application of SE on PM (see Figure 1).

### 1.1. Background to the Topic

Generally, system engineering has been misinterpreted by researchers who cannot agree on a singular way to define it. Thus, this study looks at the aspects of SE to choose those most suitable to be applied to project management research. In SE, there are many tools, methods, and skills to help complete tasks and projects (Elliott et al., 2012). Complex projects, such as engineering, feature other smaller systems in a hierarchy. The tools, methods, and goals of SE relies on general notions like functions

Figure 1. A Stove Piped View (Elliott, Roberts, Schmid & Shannon, 2012)



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