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ARCHITECTURES OF SMALL SATELLITE PROGRAMS IN DEVELOPING COUNTRIES

Abstract

Global participation in space activity is growing as satellite technology matures and spreads. Countries in Africa, Asia and Latin America are creating or reinvigorating national satellite programs. These countries are building local capability in space through technological learning. This paper analyzes implementation approaches in small satellite programs within developing countries. The study addresses diverse examples of approaches used to master, adapt, diffuse and apply satellite technology in emerging countries. The study focuses on government programs that represent the nation and seek to deliver services that provide public goods such as environmental monitoring. An original framework developed by the author examines implementation approaches and contextual factors using the concept of Systems Architecture. The Systems Architecture analysis defines the context in terms of opportunities, constraints, requirement and objectives that influence the implementation of the satellite programs. The implementation is described using a number of Architectural Views that highlight distinct aspects of the satellite programs. These definitions are applied to case studies of six satellite projects executed by countries in Africa and Asia. The architectural approaches used by these countries in various projects reveal patterns in terms of the training approach, technology approach and supplier selection. Based on these patterns, three Archetypal Project Architectures are defined which link the contextual factors to the implementation approaches. The three Archetypal Project Architectures lead to distinct opportunities for training, capability building and end user services.