

16th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND
DEVELOPMENT (D3)Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and
Development (1)

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TECHNOLOGY-DRIVEN CHALLENGES IN THE GOVERNANCE OF FUTURE SPACE COLONIES

Abstract

Recent plans for human missions to the Moon and Mars have brought the discussion of space colonization into the spotlight of the space community. Many topics remain to be clarified regarding space colonization. These range from legal, ethical and planetary protection concerns to how the colonies will be governed. Answers to these questions will vary broadly even between the two most probable off-Earth settlements in the near future (the Moon and Mars) mainly due to differences in environment and location. Different solutions will certainly bring different governance challenges according to their dependence on Earth. This paper discusses the different possibilities for the governance of future space settlements brought about by selecting a different colonial technological complex; the interdependent technologies running the colony. Future space colonies will be able to manufacture some of their tools with in-situ resources and additive manufacturing from the beginning, but some vital resources and components might only be available from Earth. This imbalance will influence the extent of the colony's independence as it grows. The whole chosen technological complex will influence the colony's development and its capability to thrive. We presume that greater reliance on its own ingenuity will bring the colony more freedom and independence, even if such development is not in the interest of the authority on Earth. Based on our knowledge of history, we can assume that reliance on technology for survival will temper the likelihood of governance shifts in critical policies related to life support systems in the early stages of space colonization. Technological innovation will likewise probably remain under centralized governance for decades. However, the possibility of political shifts within growing colonies cannot be dismissed because the current design of future survival technologies will certainly have unintended political implications. We aim to understand and analyze the various impacts of current and future technological complexes of the off-Earth colonies on their governance. We present different operational periods in the development of an off-Earth colony, based on the societal functions allowed by the required technologies. We also draw on historical parallels by studying the economic, social, and political shifts that have led colonies to seek independence. We focus on the enabling periods in which new technology becomes available to the colony and allows new political structures to arise and provide a potential evolution for the governance of the colony, from initial outpost to self-sustained settlement.