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**The importance of Complex Product Systems to  
the space industry in Australia:**

**A small satellite case study**

**A thesis submitted for the degree  
of Doctor of Philosophy of  
The Australian National University**



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National Graduate School of Management**

This thesis presents research undertaken at the National Graduate School of Management, Australian National University, under the supervision of Professor Bruce Stening. The work submitted in this thesis is a result of original research carried out by myself, except where duly acknowledged.



**James Bradfield Moody**

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James Bradfield Moody

## **Abstract**

The great paradox of the space industry in Australia is why, given a strong history of space involvement and a capacity for excellence in space and other complex projects, Australia is unique among developed countries in that it does not have a recognizable space agency and it has little space policy.

To try and understand this paradox, this thesis follows the development of the FedSat satellite project, formed in 1998 to 're-ignite the Australian Space Industry'. It asks the central question, "Can Australia develop an indigenous satellite industry made up of high-value, complex products?", framed against the backdrop of innovation, management and policy issues in a multidisciplinary context.

The techniques used to analyse the FedSat project draw heavily on the Complex Product System (CoPS) framework, which proposes that high-cost, one-off products have unique innovation, management and policy dimensions and as such, require a different approach to analysis. It is found that CoPS are not only an ideal mechanism for analyzing a satellite project, but also a means of placing the space industry within the purview of innovation theory for future comparison with other projects across a range of industry sectors.

Within the space industry, a popular management technique in the 1990s was the 'Faster, Better, Cheaper' Small Satellite Philosophy. This philosophy was applied during the development of the satellite project, once successfully and once unsuccessfully, highlighting the importance of the inherent drivers of the management philosophy. A theory is developed around the Small Satellite Philosophy to give benefits to other reduced resource CoPS, giving an insight into the relationship between complexity, management and risk in these projects.

As a key aspect of answering the research question, the policy issues surrounding the development of the satellite under the Cooperative Research Center (CRC) programme are presented. It is found that, while there may be an inherent capacity within Australia for the development of CoPS, Australia's innovation policy does not recognise their importance and the CRC framework is inherently unsuited to their development.

The key conclusion of the thesis is that, based on the current space policy and innovation mechanisms in Australia, it is currently impossible for Australia to develop a space industry made up of high-value, complex products. However, drawing on the FedSat experience, a new way for Australia to enter the space industry is presented; one that is based on the formation of specific policy to address the development of CoPS. This policy would enable projects such as FedSat to be properly coordinated and funded, if it was found that they are in the national interest and continue to build the nation's capability in the development of complex products.

This thesis aims to contribute to literature on both the application of CoPS to new industries and the development of the space industry in Australia, through the empirical analysis of a high-profile Australian project. Indeed, ideas developed in this study will form a resource for the future development of other indigenous space projects within Australia and CoPS projects internationally.

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