

MS Thesis
Department of Environmental Science and Policy
George Mason University

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Title: An Examination of the Application of Expert Elicitation and Value Tree Analysis as a Novel Decision Support Approach on an Earth Observing Enterprise

Thesis Director: Dr. A. Alonso Aguirre

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ABSTRACT

This paper analyzes a newly implemented multi-objective decision analysis (MODA) approach to assess Earth observing (EO) capabilities relied upon across the federal government. The approach develops an enterprise portfolio through value tree development with strategic and managerial input, coupled with expert elicitation at a practitioner level. The study investigates the principles of the analytic method, documents the application of the approach across federal agencies, and examines the utility and extent of the decision support analyses created from the collected data to determine the approach's ability to support analysis and inform the decision-making of the EO enterprise. The process is found to obtain a unique breadth and depth of information in a timely manner to facilitate portfolio management from high level, multi-billion dollar budget management decisions. In addition, it provides detailed analyses of communities of use at a product level. It is underpinned by the use of proven expert elicitation techniques and subject matter expert judgment. It transparently translates a previously disconnected, vast set of knowledge into an aggregated and actionable quantitative assessment and has evolved to influence various levels of policy. It assists the National Oceanic and Atmospheric Administration (NOAA) and the United States Geological Survey's (USGS) decision-making processes and informed the White House Office of Science and Technology Policy's (OSTP) 2014 National Plan on Civil Earth Observations. Though expert analysts, multiple tools, and many subject matter experts are needed to create analyses for decision makers, this approach offers an effective process to define, portray, and visualize the complexity and connectedness of a large-scale technological sector, such as EO capabilities.