

Rayno, Bruce; Parnell, Gregory S.; Burk, Roger C.; Woodruff, Brian W.

A methodology to assess the utility of future space systems. (English) Zbl 1078.91523
J. Multi-Criteria Decis. Anal. 6, No. 6, 344-354 (1997).

Summary: The Air Force SPACECAST 2020 study identified and prioritized some future space systems and technologies required in the next century. This paper presents the results of research on the SPACECAST 2020 value model. The model determines and prioritizes future space systems utility towards controlling and exploiting space. This research identifies the assumptions and simplifications in the additive utility function and assesses modifications. The research shows that mutual utility independence of the mission areas is a reasonable assumption. Mutual utility independence allows the use of the multiplicative and multilinear utility functions. Also, the SPACECAST 2020 scoring functions used the same scoring scale and only measured the utility of future capabilities. This study makes modifications to the SPACECAST 2020 measure-of-merit scoring functions. It replaces most of these functions with either a concave, convex, linear or S scoring function, which have expanded capability ranges to include both current and future capabilities. The modified scoring functions and alternative utility functions do not alter the SPACECAST 2020 results but do improve the credibility and future usefulness of the model. This study shows that the initial assumption of using an additive utility function is also valid.

Reviewer: [Reviewer \(Berlin\)](#)

MSC:

[91B06](#) Decision theory

[91B16](#) Utility theory

Keywords:

decision analysis; value-focused thinking; research and development; prioritization; multiattribute utility theory

Full Text: [DOI](#)