

Utility Theory

Week 4 Framing

Required Reading:

de Neufville, Richard, *Applied Systems Analysis: Engineering Planning and Technology Management*, McGraw-Hill, New York, 1990. Chapters [18](#), [19](#), [20](#), [21](#).

[McManus, H. L., and Ross, A. M., SSPARC Book Material for Lecture 4.](#)

[Gumbert, C. C., Violet, M. D., Hastings, D. E., Hollister, W. M., and Lovel, R. R., "Cost per Billable Minute Metric for Comparing Satellite Systems, Journal of Spacecraft and Rockets, Vol. 34, No. 6, 1997, pp. 837-846.](#)

[Shaw, G. M., Miller, D. W., and Hastings, D. E., "Development of the Quantitative Generalized Information Network Analysis \(GINA\) Methodology for Satellite Systems," Journal of Spacecraft and Rockets, Vol. 38, No. 2, 2001, pp. 257-269.](#)

[Thurston, D. L., "Real and Misconceived Limitations to Decision Based Design with Utility Analysis," Journal of Mechanical Design, Vol. 123, June 2001, pp. 176-82.](#)

Suggested Reading:

Keeney, Ralph L., and Raiffa, Howard, *Decisions with Multiple Objectives: Preferences and Value Tradeoffs*, Cambridge University Press, Cambridge, UK, 1993.

Ross, A. M., "Multi-Attribute Tradespace Exploration with Concurrent Design as a Value-Centric Framework for Space System Architecture and Design," Master of Science Thesis in Aeronautics and Astronautics and Technology and Policy, Massachusetts Institute of Technology, June 2003. ([excerpt covering determination of utilities](#))

"B-TOS Architecture Study," 16.89 Space Systems Engineering Final Report, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology, May 2001. ([excerpt covering determination of utilities](#))

[Spaulding, Timothy J., "Tools for Evolutionary Acquisition: A Study of Multi-Attributes Tradespace Exploartion \(MATE\) Applied to the Space Based Radar \(SBR\), Master of Science Thesis in Aeronautics and Astronautics, Massachusetts Institute of Technology.](#)

[Seshasai, Satwiksai, "Knowledge Based Approach to Facilitate Engineering Design," Masters Thesis in Electrical Engineering, Massachusetts Institute of Technology, May 2002.](#)

[Scott, M. J. and Antonsson, E. K., "Arrow's Theorem and Engineering Design Decision Making," Research in Engineering Design, Vol. 11, No. 4, pp. 218-28.](#)

[Otto, K. N., and Antonsson, E. K., "The Method of Imprecision Compared to Utility Theory for Design Selection Problems." <full ref?>](#)

Review slides:

[Lecture 4](#)

Problem:

See SSPARC Book Material