

DECISION THEORY

Preference Programming

incomplete information

in value tree analysis

sensitivity of university rankings

- what if slightly different weights were applied?

interval methods:

Preference Assessment by Imprecise

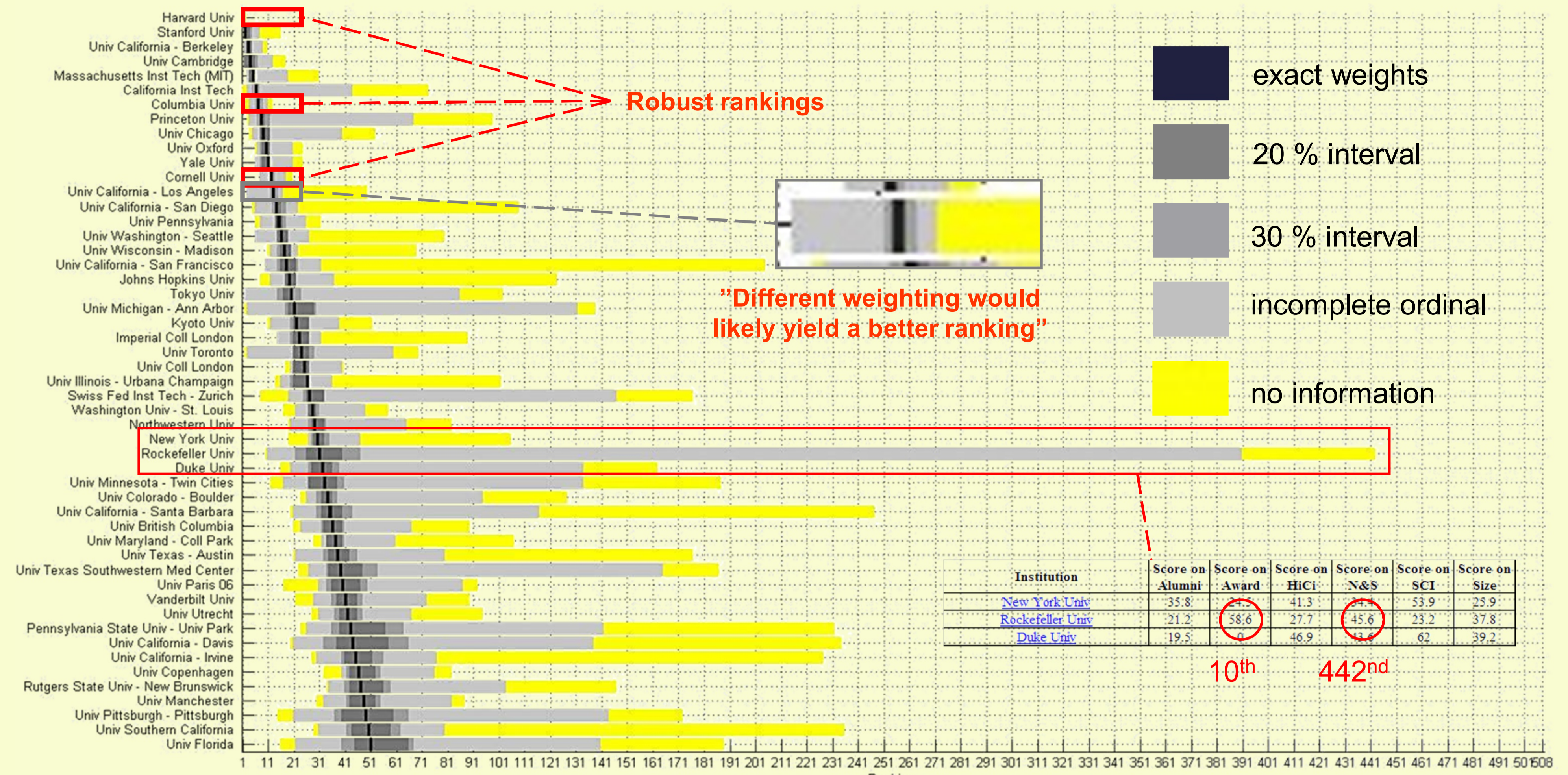
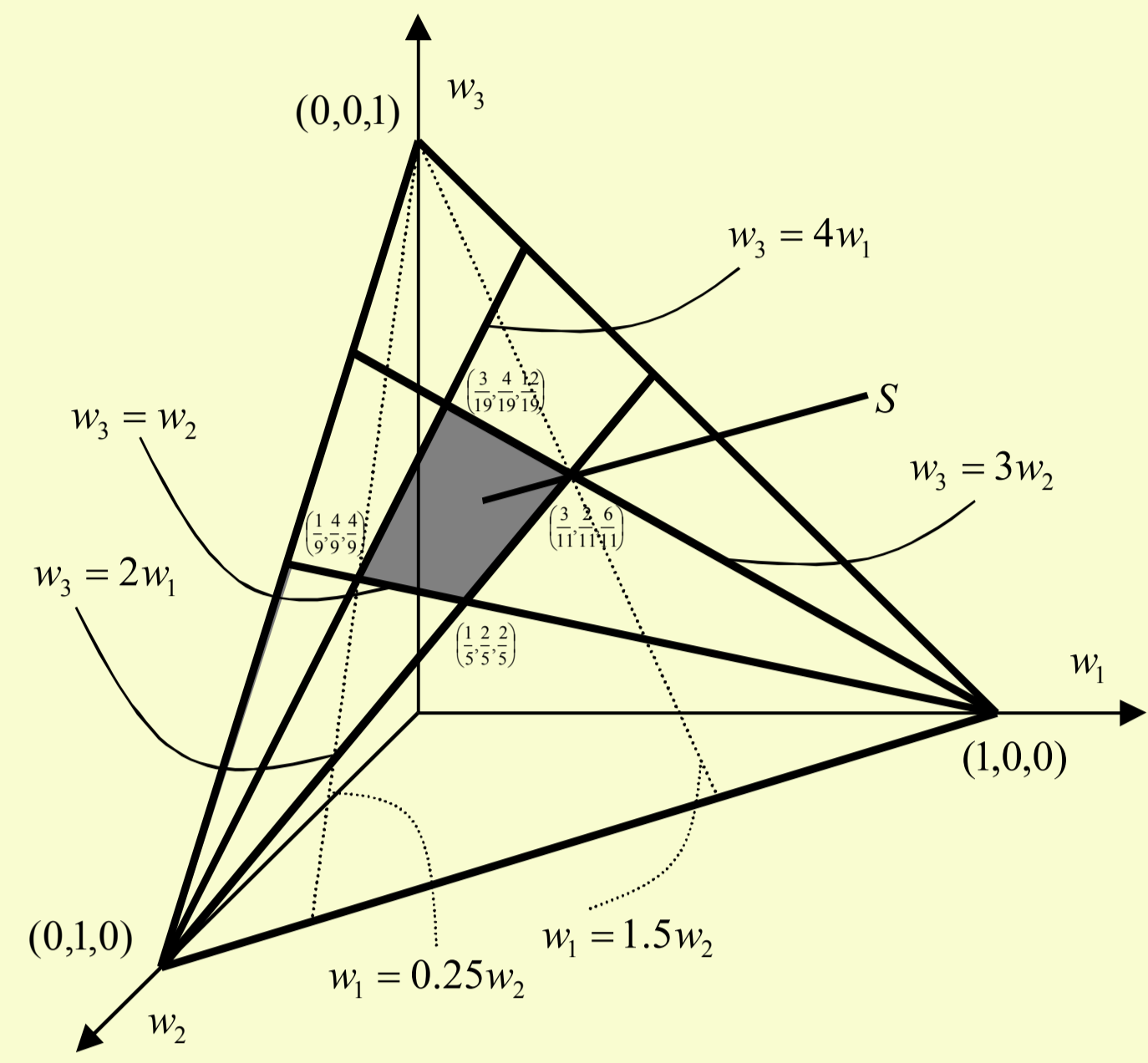
Ratio Statements (PAIRS)

Interval AHP

Preference Ratios in Multiattribute Evaluation

(PRIME)

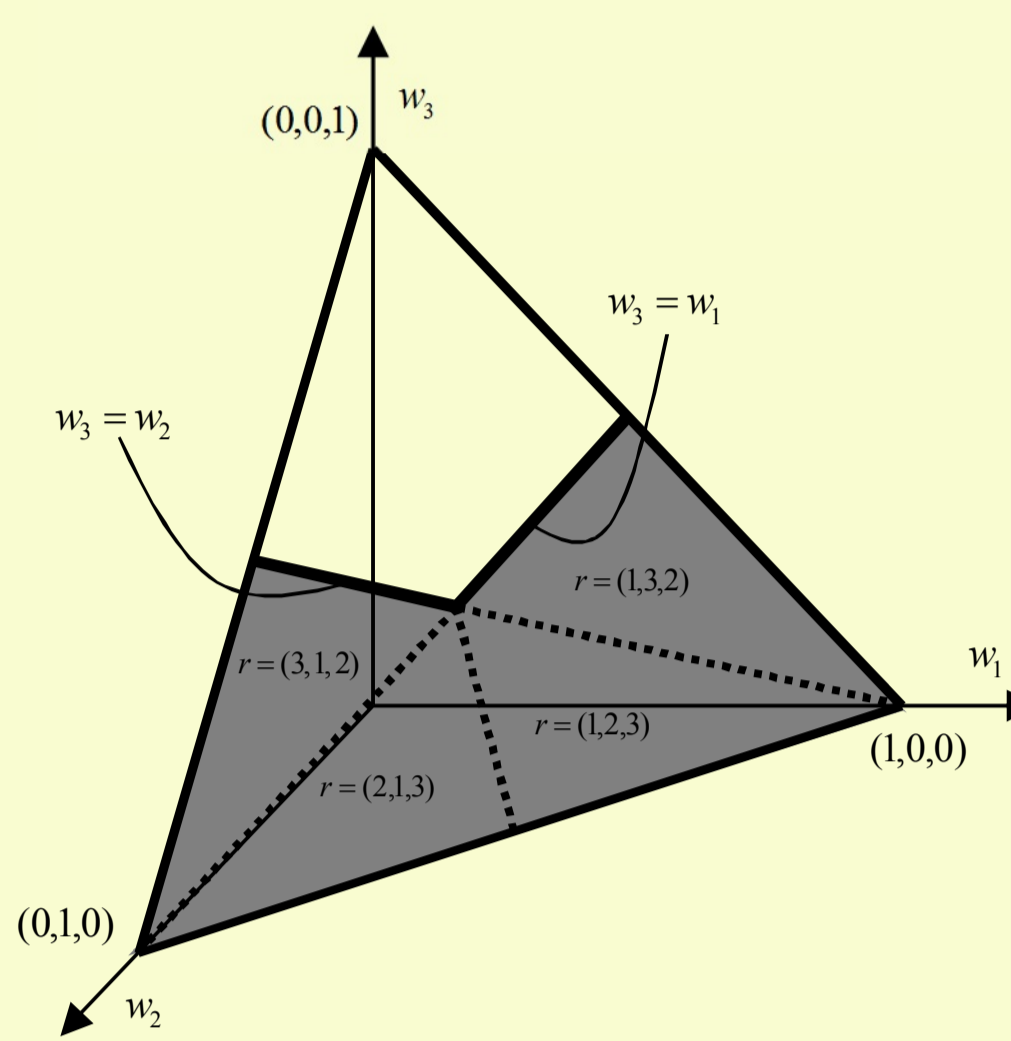
Interval SMART/SWING



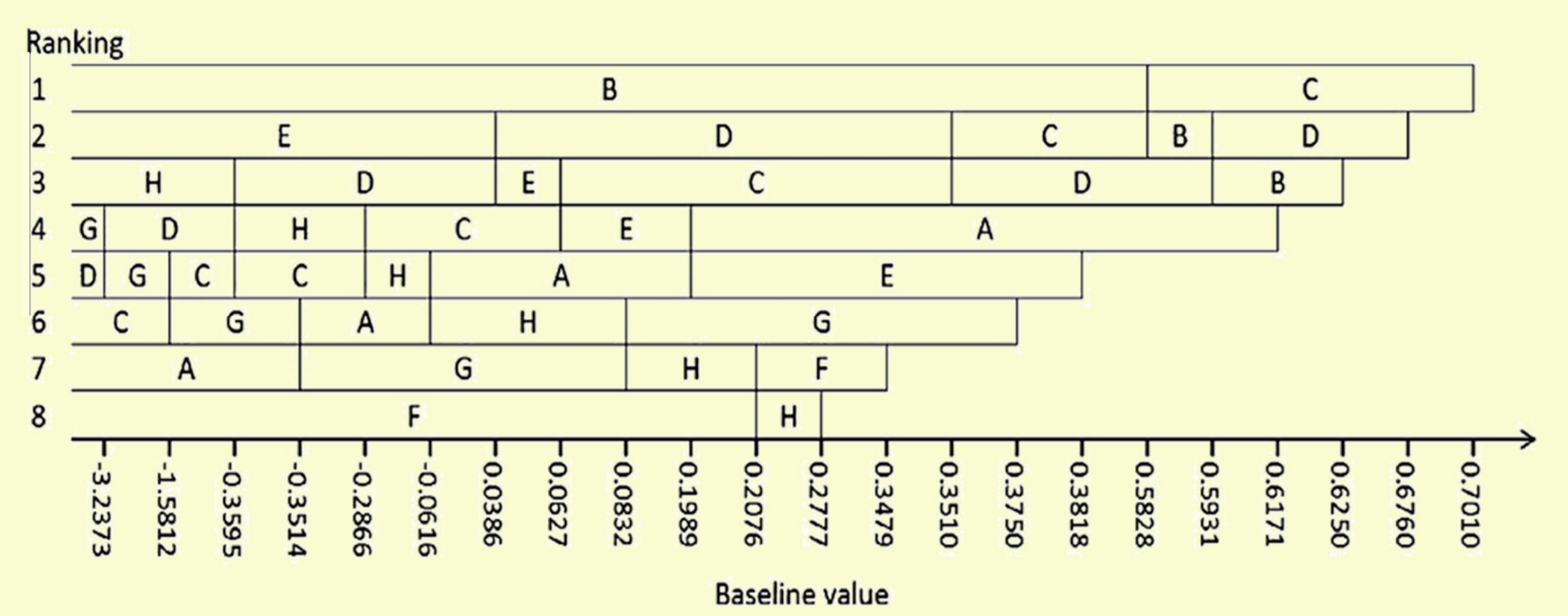
incomplete ordinal information:

Rank Inclusion in Criteria Hierarchies (RICH)

RICHER = RICH with Extended Rankings

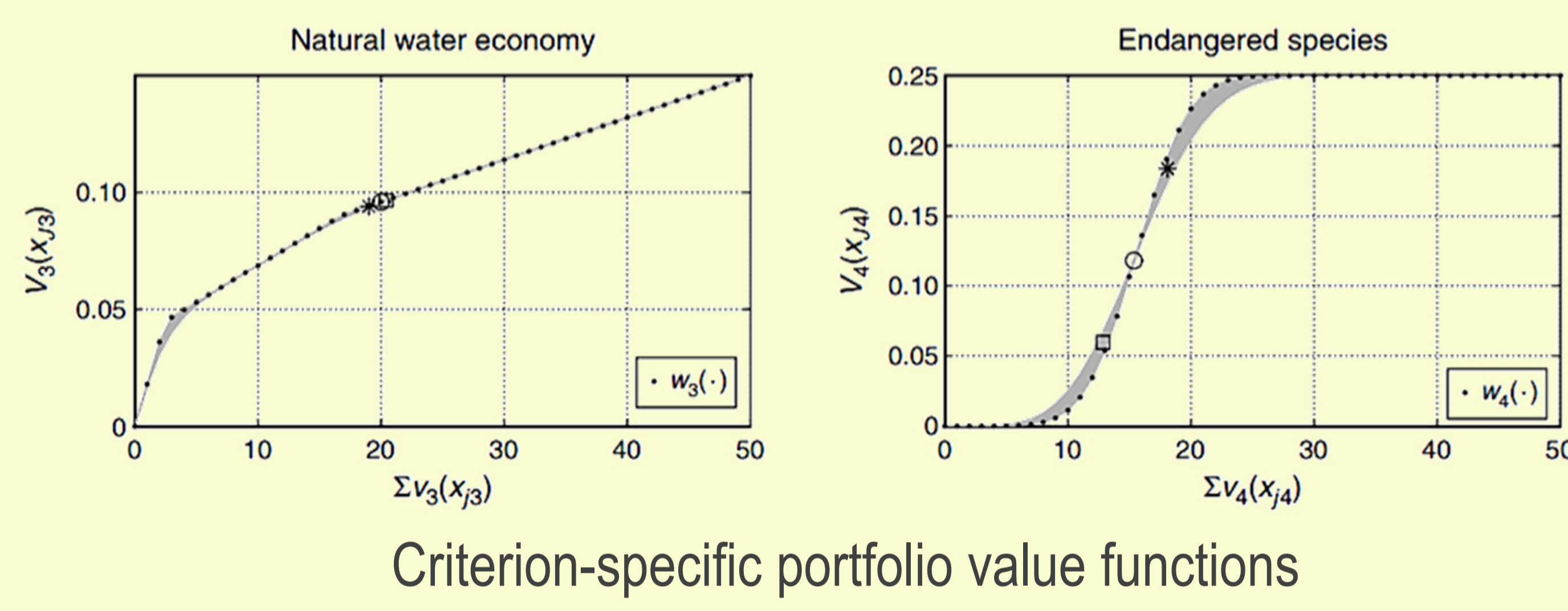


projects' benefit-to-cost rankings



axiomatic foundations of multi-attribute portfolio value models

$$V(x) = \sum_{I' \subseteq I} \lambda(I') \prod_{i \in I'} \frac{V_i(x_j^i)}{\lambda(\{i\})} \prod_{i \notin I'} \left(1 - \frac{V_i(x_j^i)}{\lambda(\{i\})}\right)$$



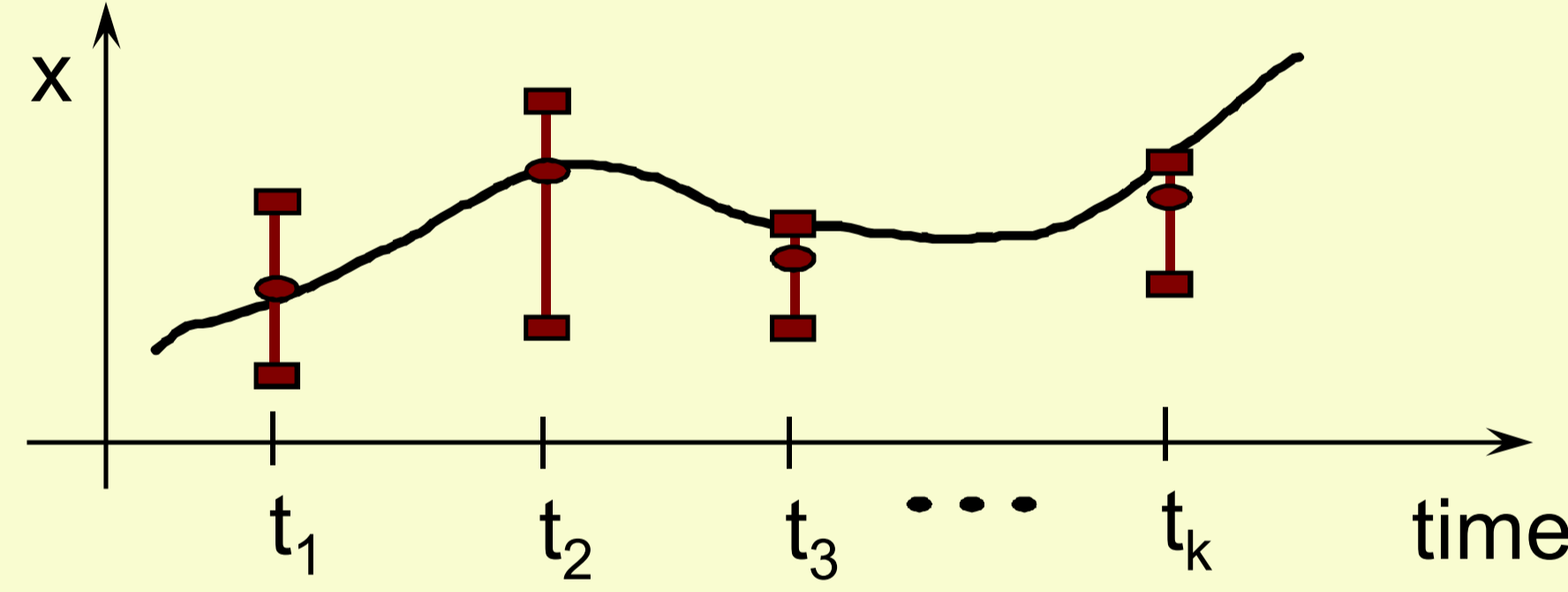
ratio-based efficiency analysis

comparison of DMUs under incomplete information about the output and input weights

$$\text{Efficiency of DMU}_k = E_k = \frac{\text{value of outputs}}{\text{value of inputs}} = \frac{\sum_{n=1}^N u_n y_{nk}}{\sum_{m=1}^M v_m x_{mk}}$$

interval goal programming

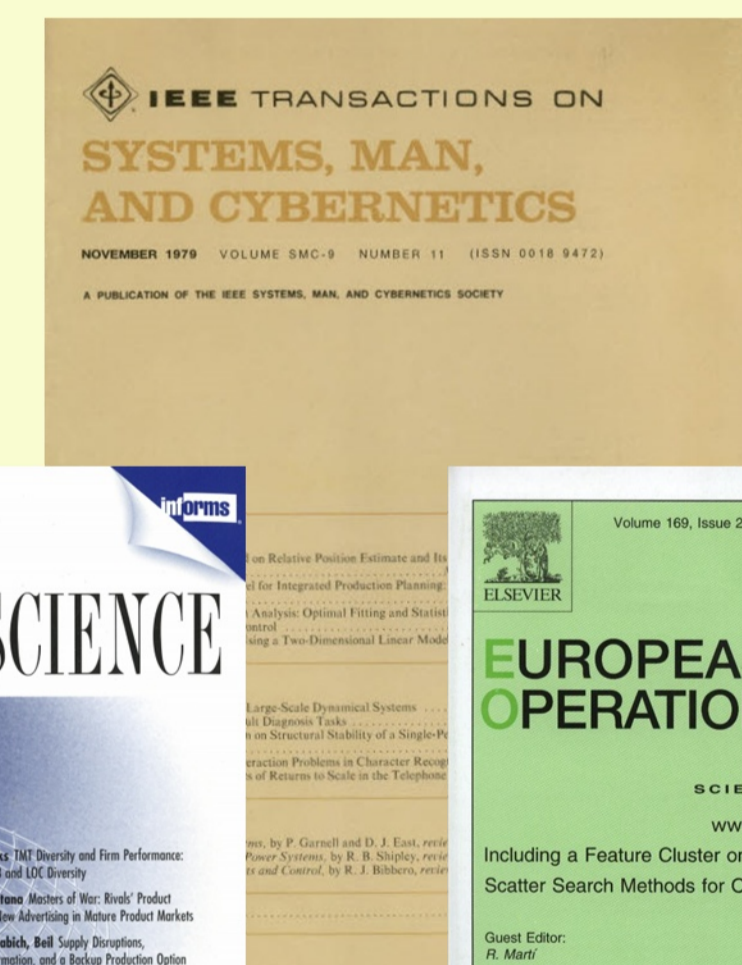
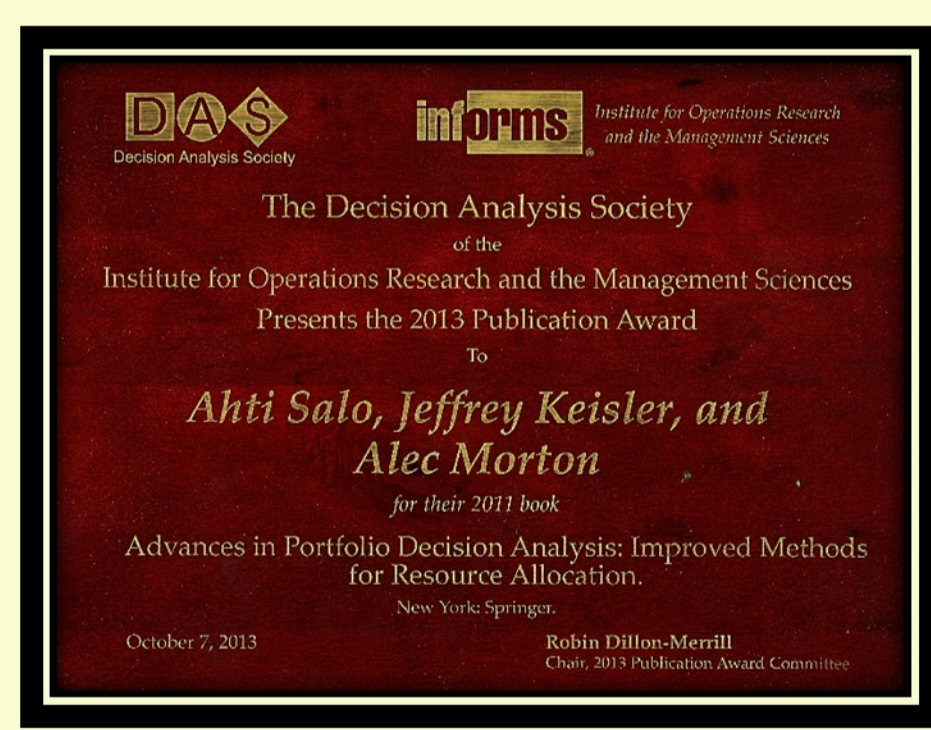
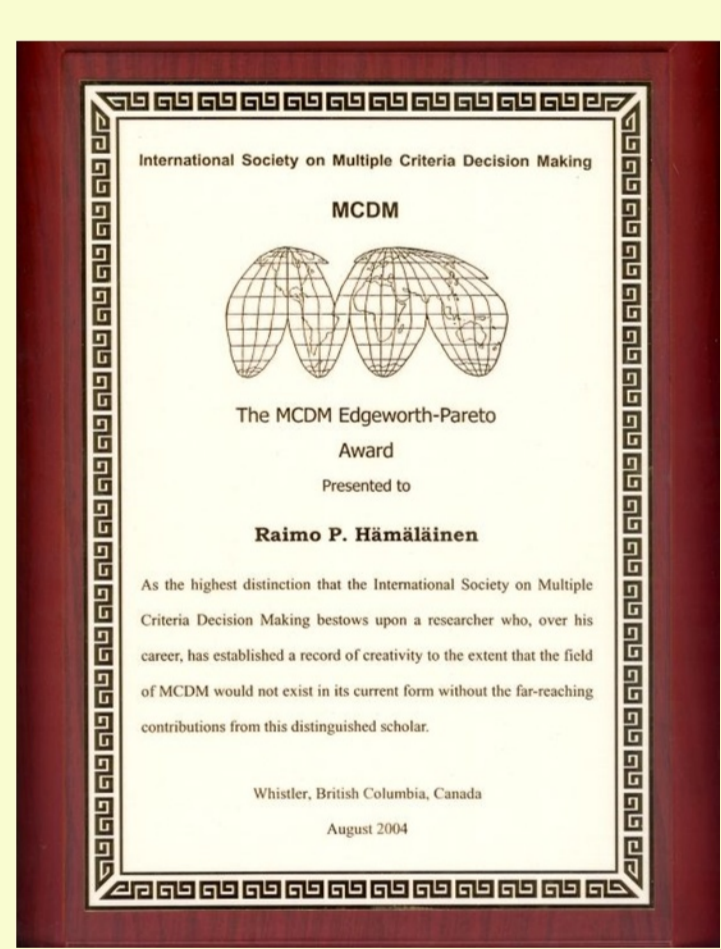
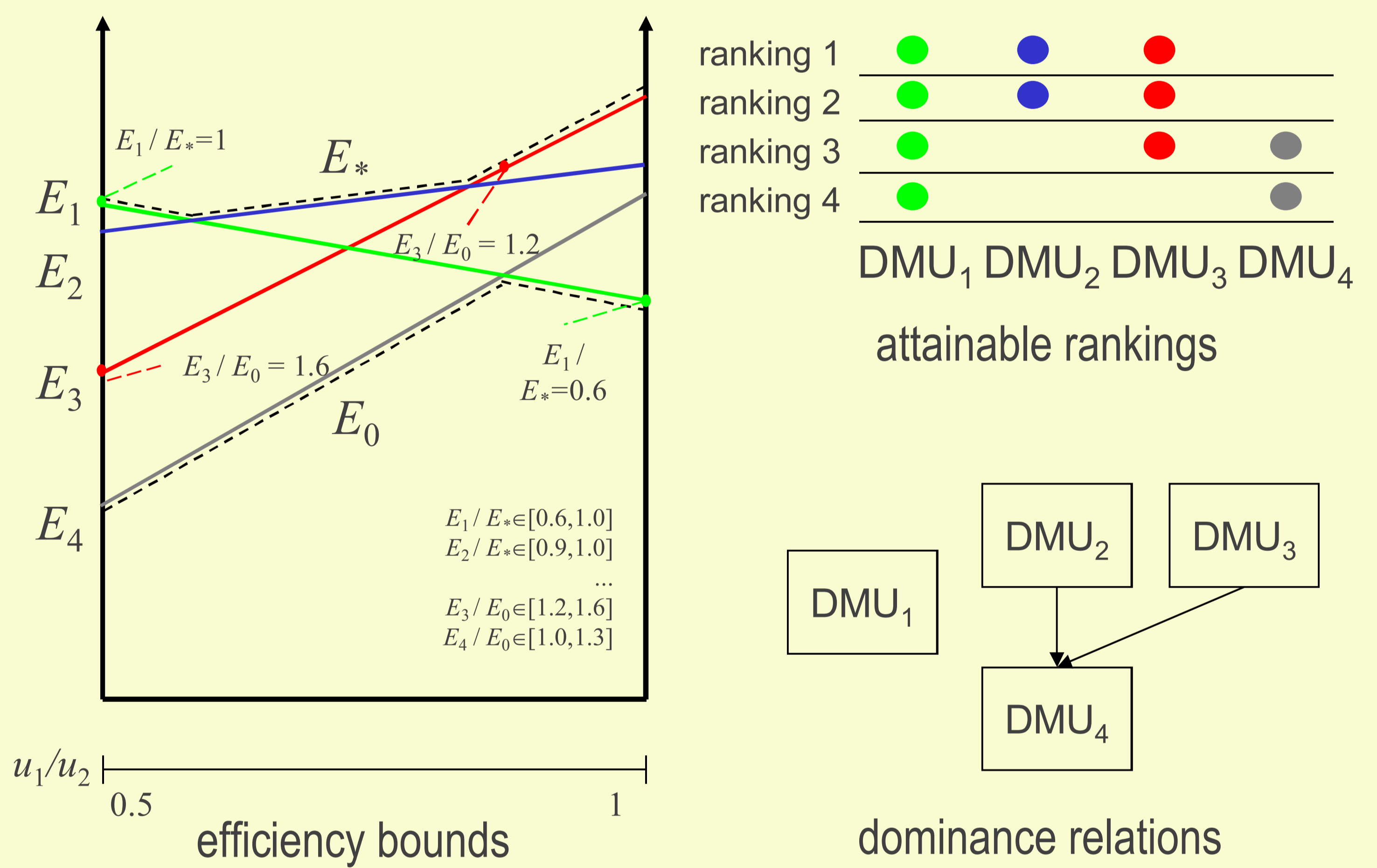
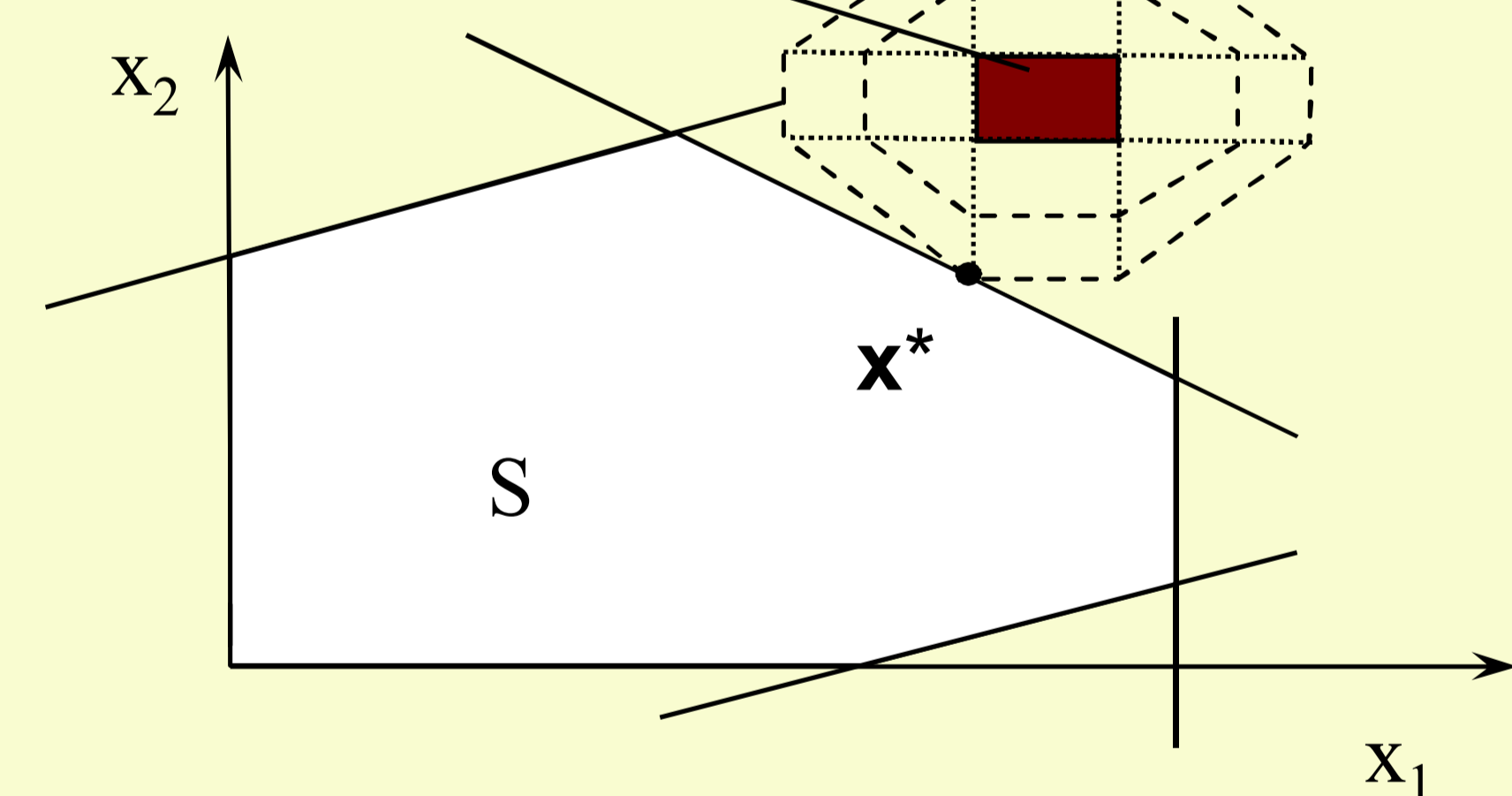
new flexibility in dynamic problems



extension of a goal point to a goal set

Goal set (intervals):

$([l_1, u_1], [l_2, u_2])$



selected publications

- J. Liesiö and A. Punkka: Baseline value specification and sensitivity analysis in multiattribute project portfolio selection, *Eur. J. Oper. Res.*, 2014
- J. Liesiö: Measurable multiattribute value functions for portfolio decision analysis, *Decision Analysis*, 2014
- A. Punkka and A. Salo: Preference Programming with incomplete ordinal information, *Eur. J. Oper. Res.*, 2013
- A. Salo and A. Punkka: Ranking intervals and dominance relations for Ratio-based Efficiency Analysis, *Management Science*, 2011
- A. Salo and R. P. Hämäläinen: Preference Programming - multicriteria weighting models under incomplete information, in: Zopounidis and Pardalos (eds.): *Handbook of Multicriteria Decision Analysis*, Springer, New York, 2010
- J. Liesiö, P. Mild and A. Salo: Preference programming for robust multi-criteria portfolio modeling and project selection, *EJOR*, 2007
- J. Mustajoki, R. P. Hämäläinen and M. R. K. Lindstedt: Using intervals for global sensitivity and worst case analyses in multiattribute value trees, *Eur. J. Oper. Res.*, 2006
- A. Salo and A. Punkka: Rank inclusion in criteria hierarchies, *Eur. J. Oper. Res.*, 2005
- J. Mustajoki, R. P. Hämäläinen and A. Salo: Decision Support by Interval SMART/SWING - Incorporating Imprecision in the SMART and SWING Methods, *Decision Sciences*, 2005
- A. Salo and R. P. Hämäläinen: Preference ratios in multiattribute evaluation (PRIME), *IEEE Syst. Man Cybernetics*, 2001
- R. P. Hämäläinen and J. Mäntysaari: A dynamic interval goal programming approach to the regulation of a lake-river system, *J. Multicri. Dec. Anal.*, 2001
- A. Salo and R. P. Hämäläinen: Preference programming through approximate ratio comparisons, *Eur. J. Oper. Res.*, 1995
- A. Salo and R. P. Hämäläinen: Preference assessment by imprecise ratio statements, *Operations Research*, 1992