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Background

- The US Army spends millions of dollars each year moving officers between duty stations.
- Large talent pool to manage.
- Tradeoffs exist between cost and personnel readiness.
- Match criteria include training, rank, and experience.
- A lack of decision support models allows for bias and system-gaming to reduce the efficiency of the process.

Process

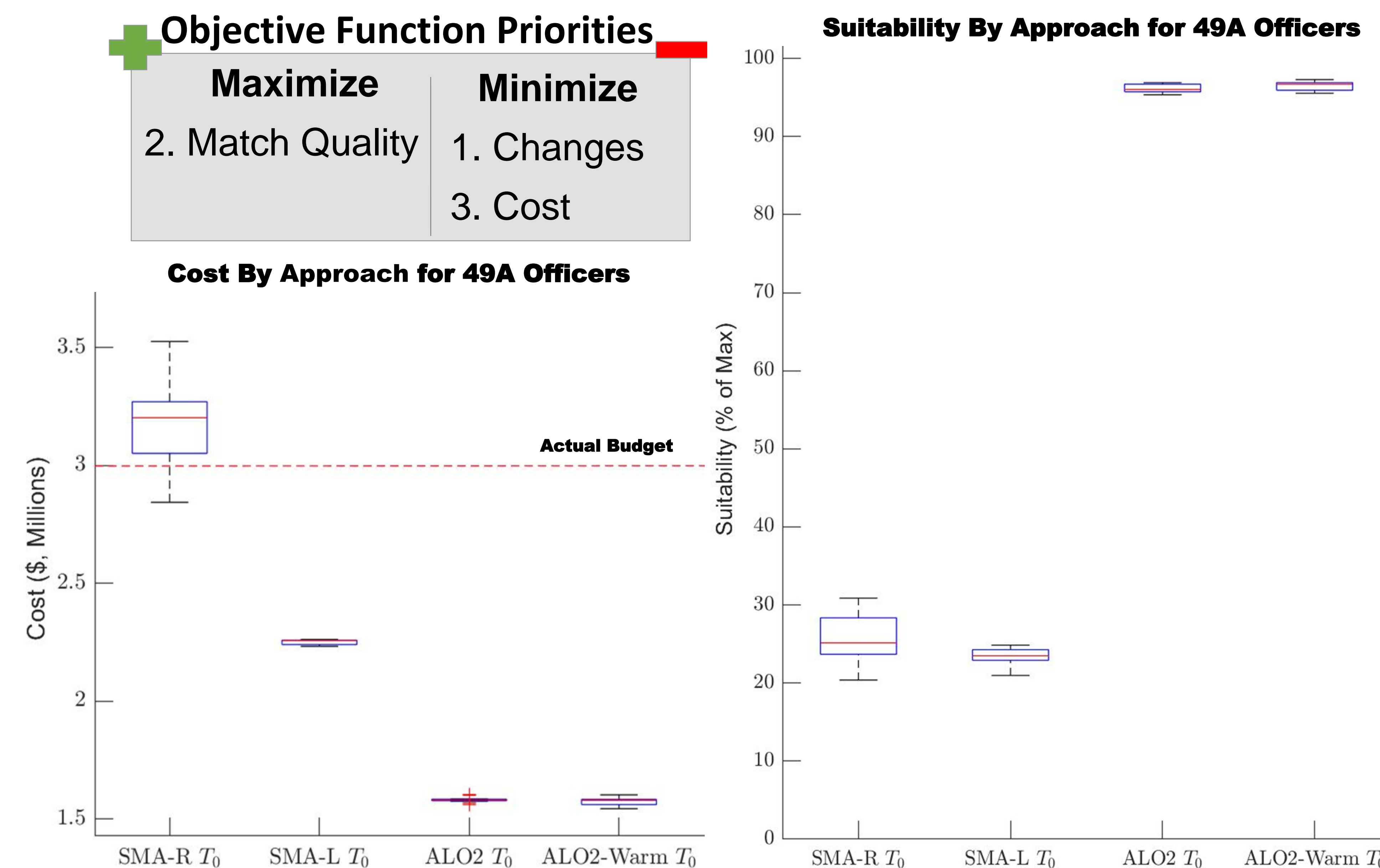
1. Transform and map data to useable dataset.
2. Model the problem as a mixed integer linear program (MILP).
3. Establish baseline using historical data and the stable marriage algorithm (SMA).
4. Optimize MILP model.
5. Develop tools to visualize the tradeoffs between quality of match and cost

Assumptions

- Job lists were not given, so the list of jobs is derived from the list of officers. We assume one job for each officer.
- The estimated cost of each year is assumed to be the budget for that year

Model Development

*Operations Research Officers (49A) were identified as a subset to study while developing the model



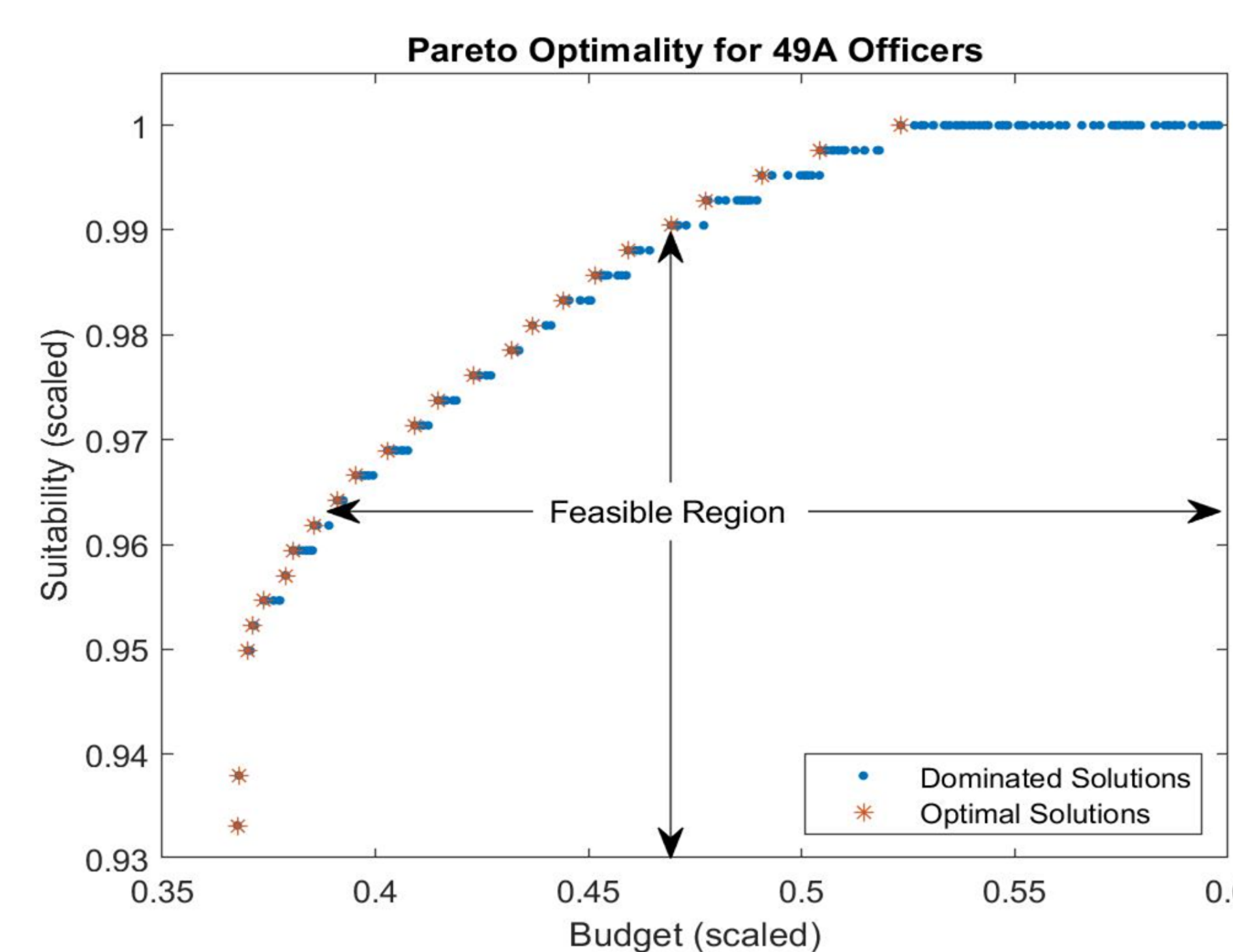
Stable Marriage Algorithm (SMA)

- Baseline (over budget).
- Considers match quality only.
- Relies on Officer preferences.
- Improved results with ordering (cost breaks ties).

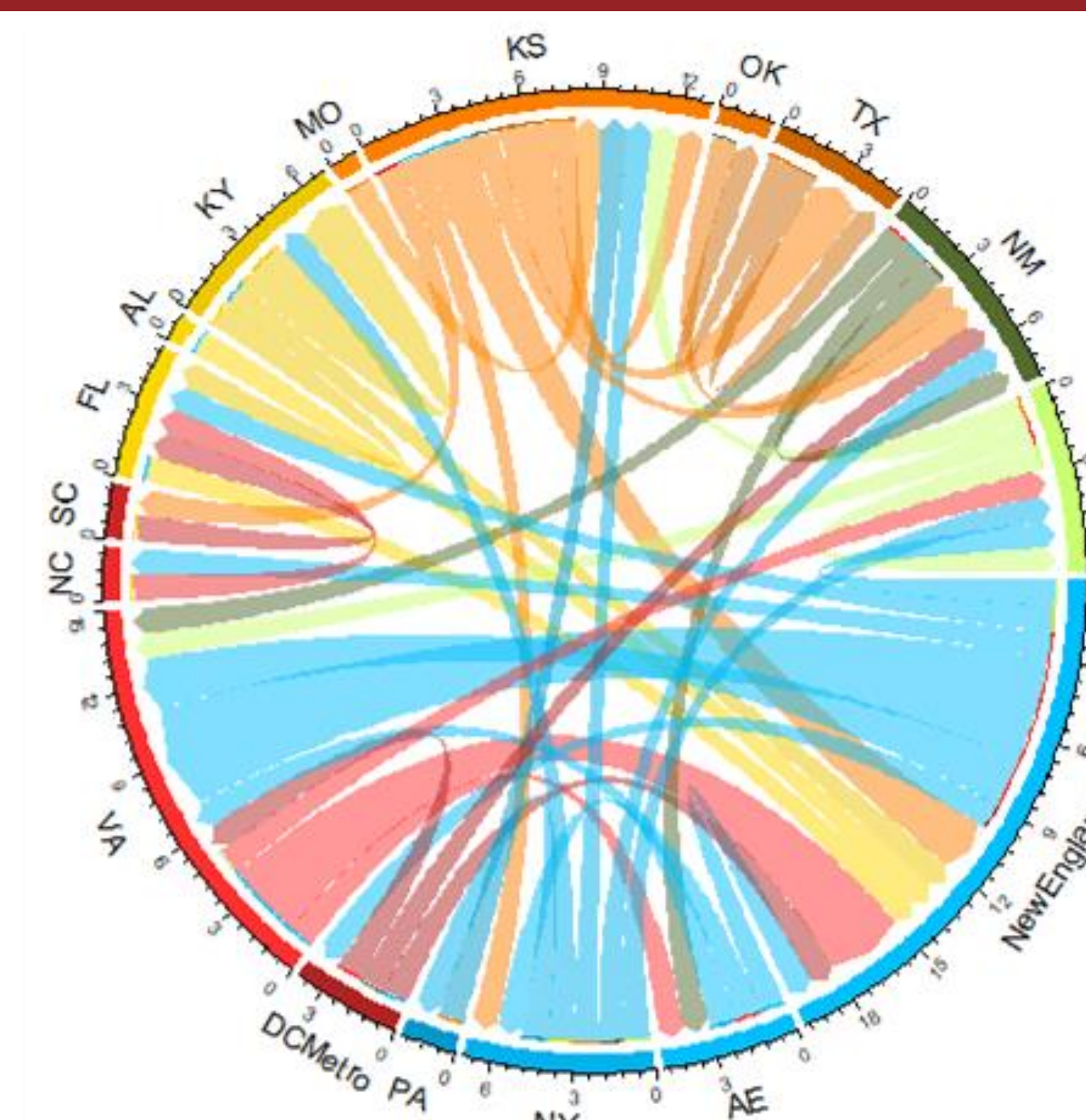
Automatic Lexicographic Optimization (ALO)

- Further improved results.
- Balances all 3 objectives.
- Finds fewest changes, then suitability, then cost
- Does not consider preference.
- Warm and cold starts yield similar results.

Preliminary Results



High Suitability solutions can be achieved with a 40% reduction in spending.



Key Takeaways

- Multiobjective optimization can greatly improve the results of this assignment problem for this subset of officers and jobs.
- Reduce effects of subjectivity and system gaming.
- Further research will explore the applicability to all officer groups.
- Visual tools are critical to see cost-quality tradeoffs in real time.