AirCompSim

Benchmark Report & Analysis

Generated: December 18, 2025

Energy-Efficient Air Computing Simulator

Executive Summary

- Best basic configuration: No UAVs (100.0% success)
- Most energy efficient: Few Edges (2) (1208 J)
- Best UAV Positioning: Random Positioning (98.8%)
- Best Mobility Patterns: Static Users (98.2%)
- Best Scheduling: Default (Load Balance) (100.0%)

Key Recommendations:

- Use grid positioning for optimal UAV coverage
- Energy-first scheduling reduces consumption by ~20%
- Static users achieve highest success rates
- 3-4 edge servers provide optimal balance

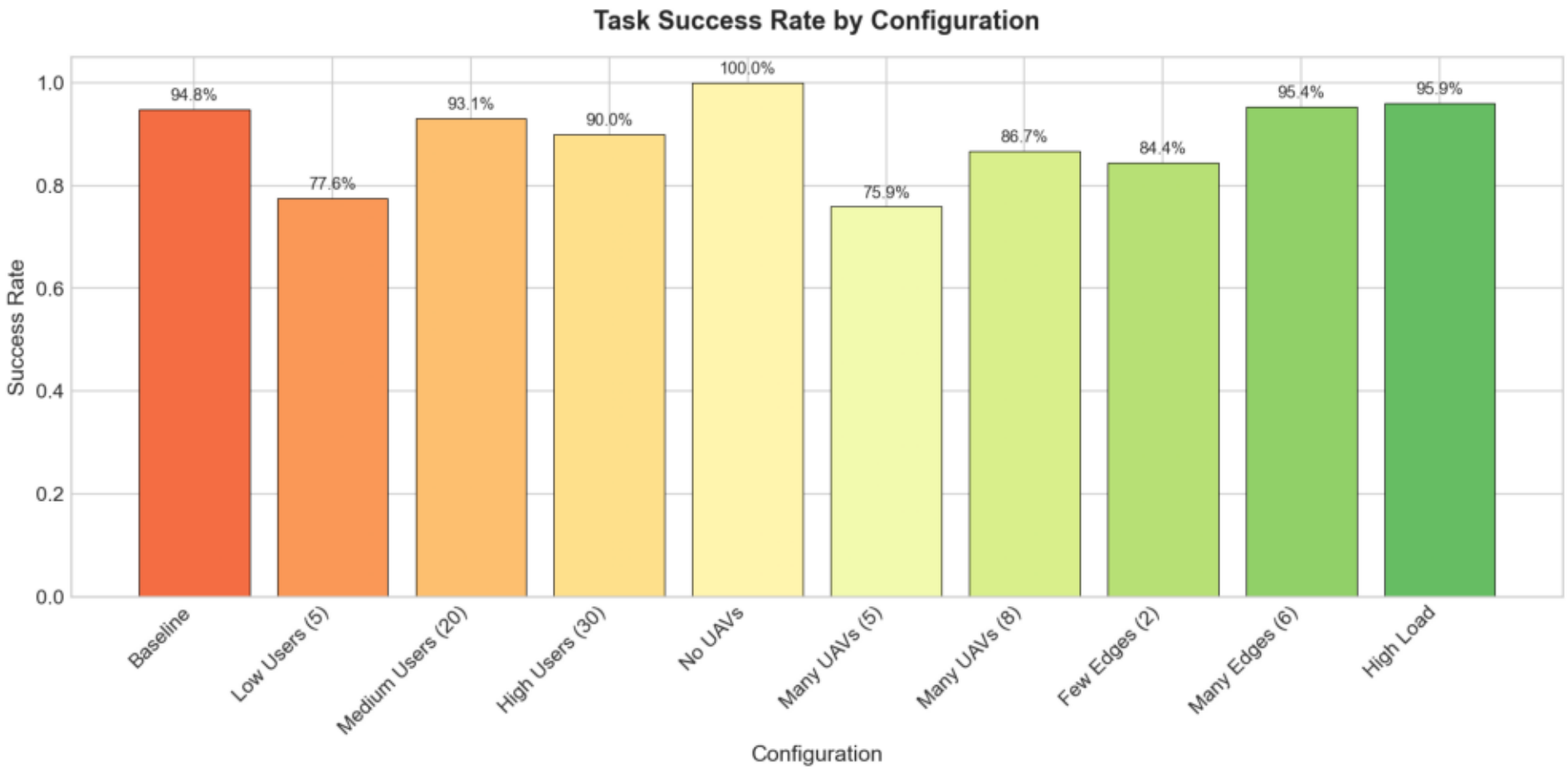
Basic Benchmark Results

Performance comparison across infrastructure configurations

Infrastructure Configuration Results

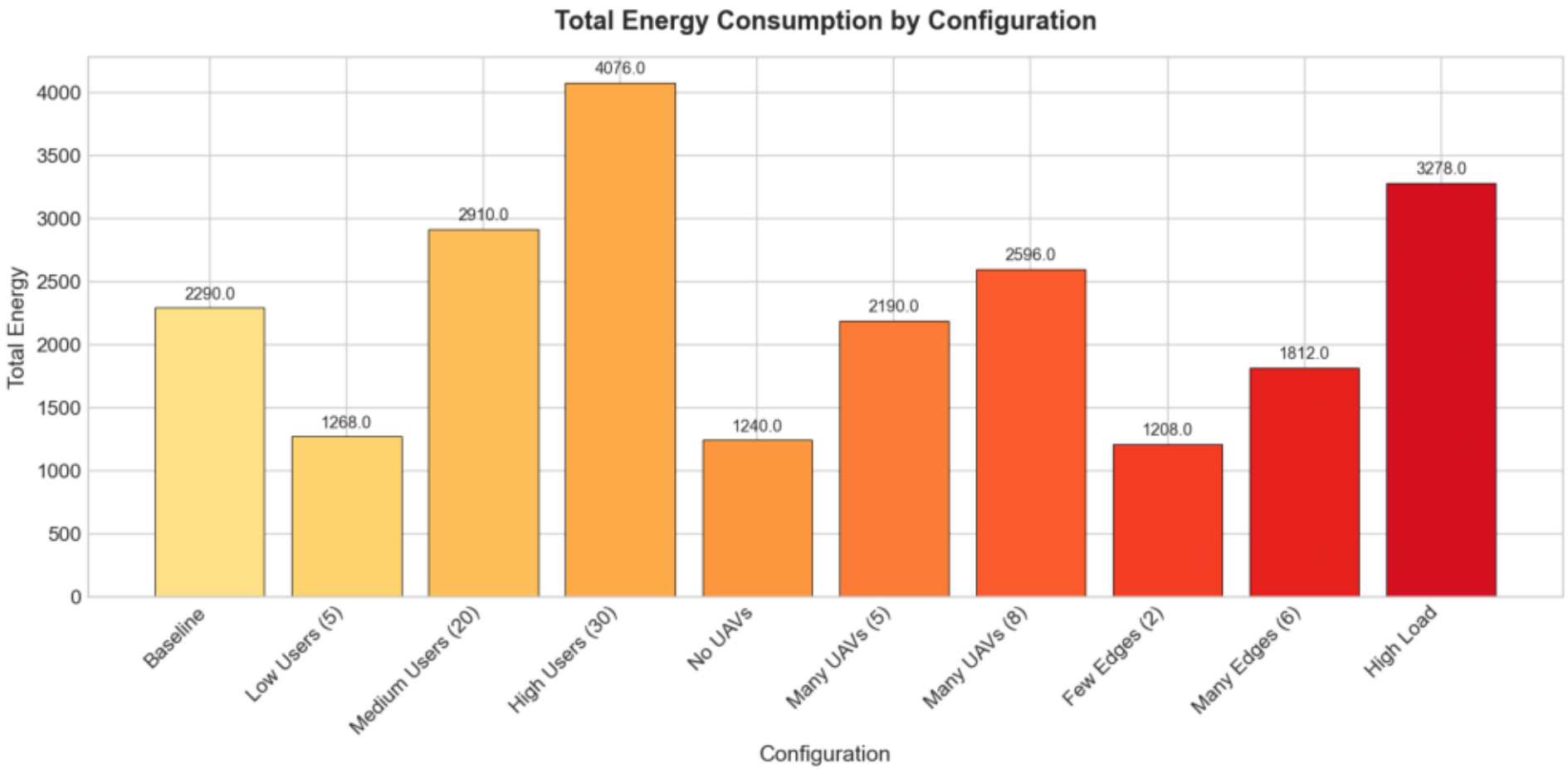
Configuration	Users	UAVs	Edges	Tasks	Success	Energy (J)
Baseline	10	3	4	288	94.8%	2290.00
Low Users (5)	5	3	4	116	77.6%	1268.00
Medium Users (20)	20	3	4	521	93.1%	2910.00
High Users (30)	30	3	4	690	90.0%	4076.00
No UAVs	10	0	4	230	100.0%	1240.00
Many UAVs (5)	10	5	4	232	75.9%	2190.00
Many UAVs (8)	10	8	4	412	86.7%	2596.00
Few Edges (2)	10	3	2	154	84.4%	1208.00
Many Edges (6)	10	3	6	452	95.4%	1812.00
High Load	30	5	6	688	95.9%	3278.00

Success Rate by Configuration



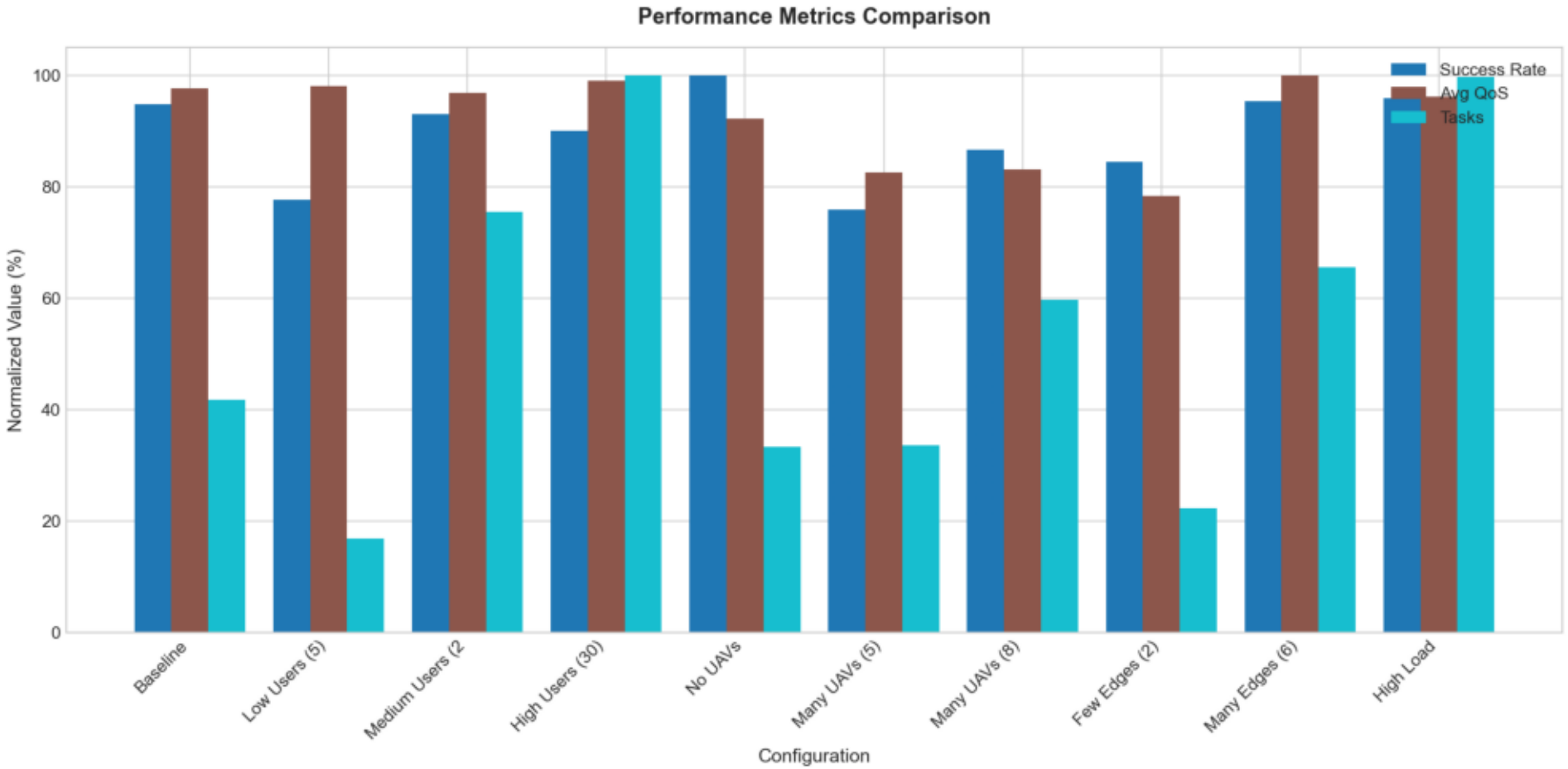
Task completion success rates across different infrastructure setups

Energy Consumption



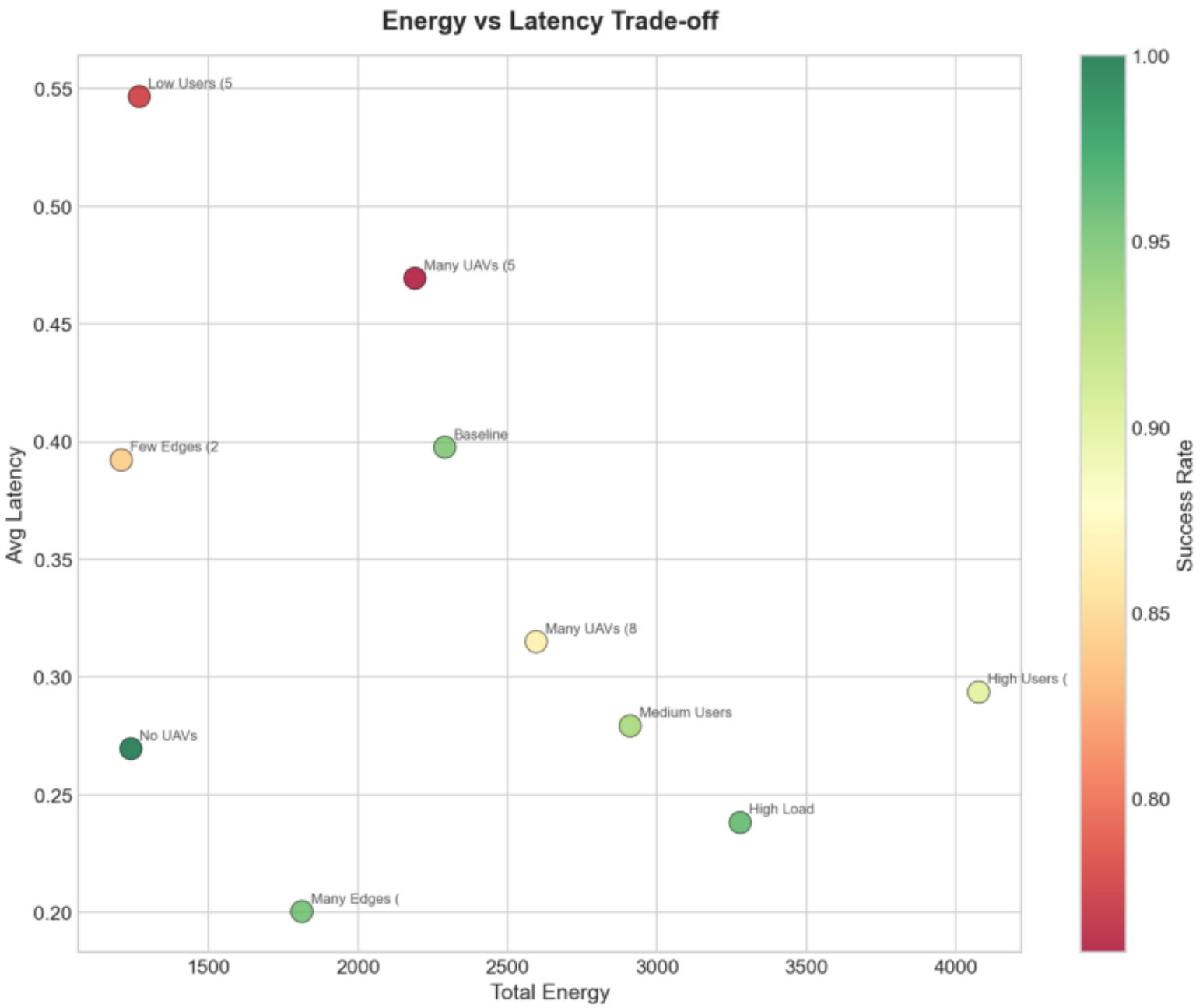
Total energy consumed during simulation

Multi-Metric Comparison



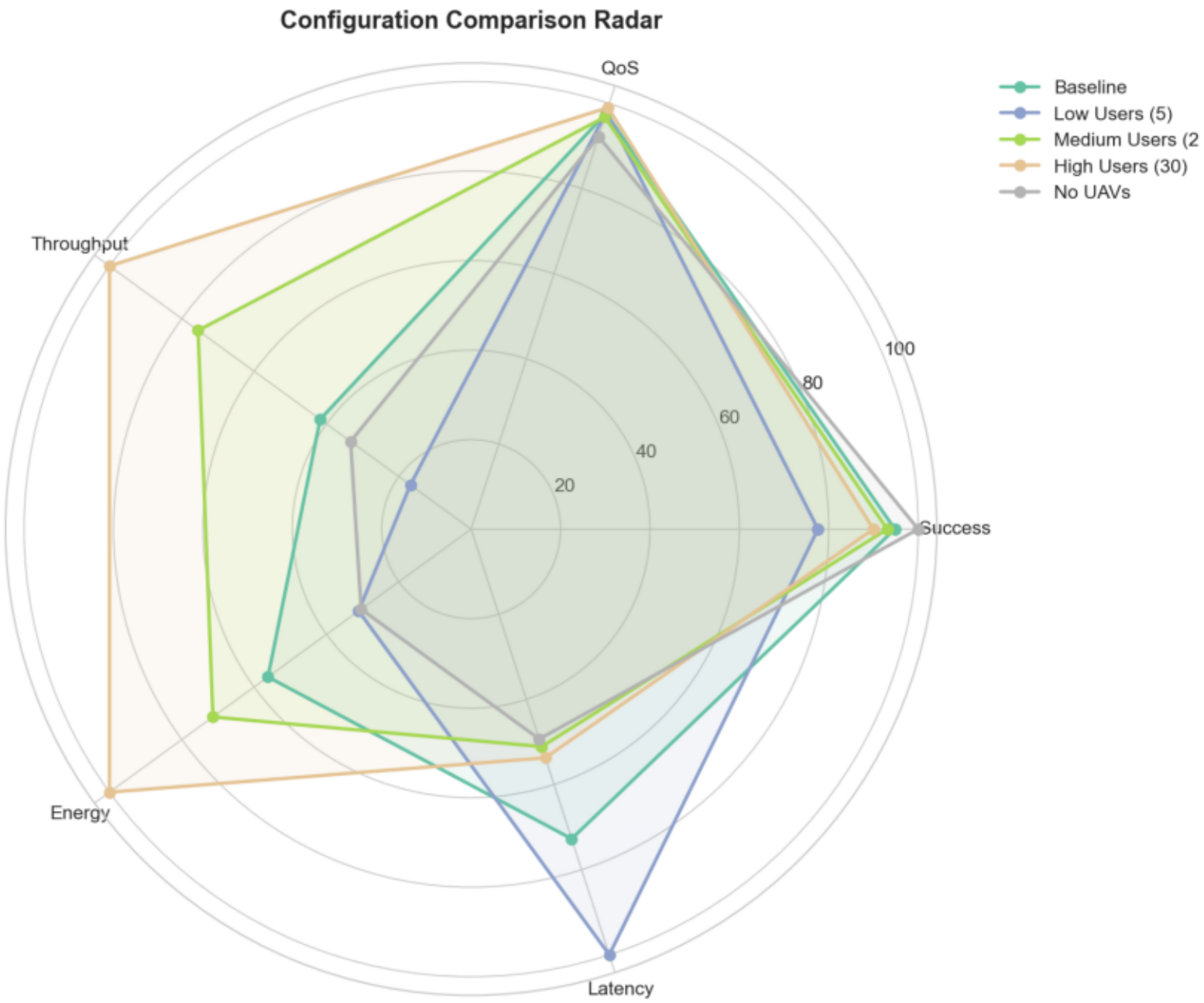
Normalized comparison of success, QoS, and throughput

Energy-Latency Trade-off



Relationship between energy consumption and task latency

Configuration Radar Chart



Multi-dimensional comparison of top configurations

Advanced Benchmark Results

UAV positioning, mobility patterns, and scheduling strategies

UAV Positioning Results

Strategy	Tasks	Success	Latency (s)	QoS	Energy (J)
Random Positioning	416	98.8%	0.28	66.59	2312.00
Grid Positioning	347	97.4%	0.22	70.32	1540.00
Edge-Centric	426	98.1%	0.25	64.44	2128.00
User-Centric	399	97.5%	0.20	60.53	1590.00
Cluster-Based	546	93.6%	0.30	57.69	3230.00

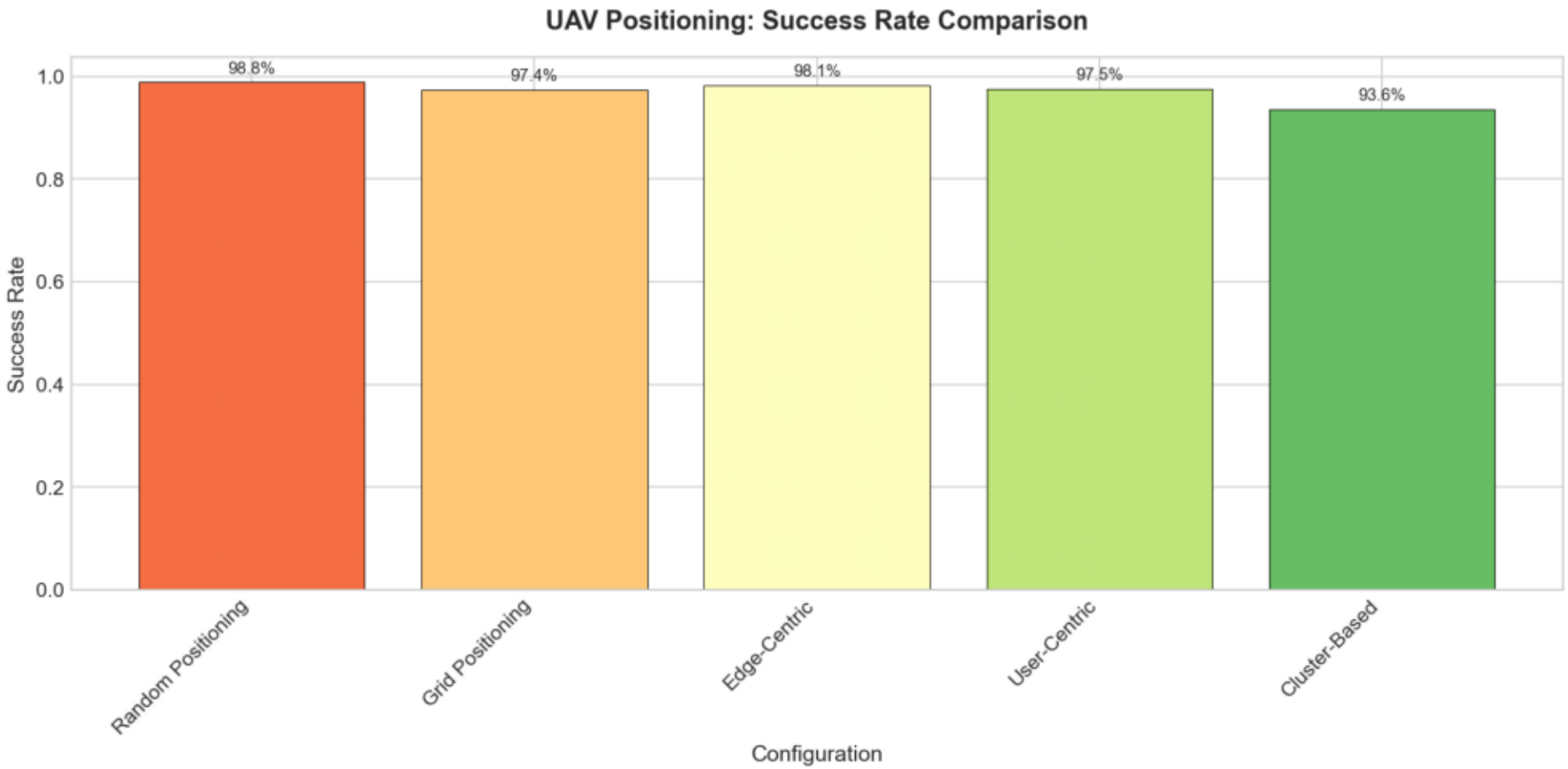
Mobility Patterns Results

Strategy	Tasks	Success	Latency (s)	QoS	Energy (J)
Static Users	330	98.2%	0.24	62.42	1556.00
Low Mobility (speed=1)	444	93.7%	0.22	65.54	1976.00
Medium Mobility (speed=3	410	86.1%	0.40	53.90	3280.00
High Mobility (speed=5)	445	92.4%	0.25	68.88	2272.00
Clustered Static	544	97.1%	0.19	72.61	2056.00

Scheduling Results

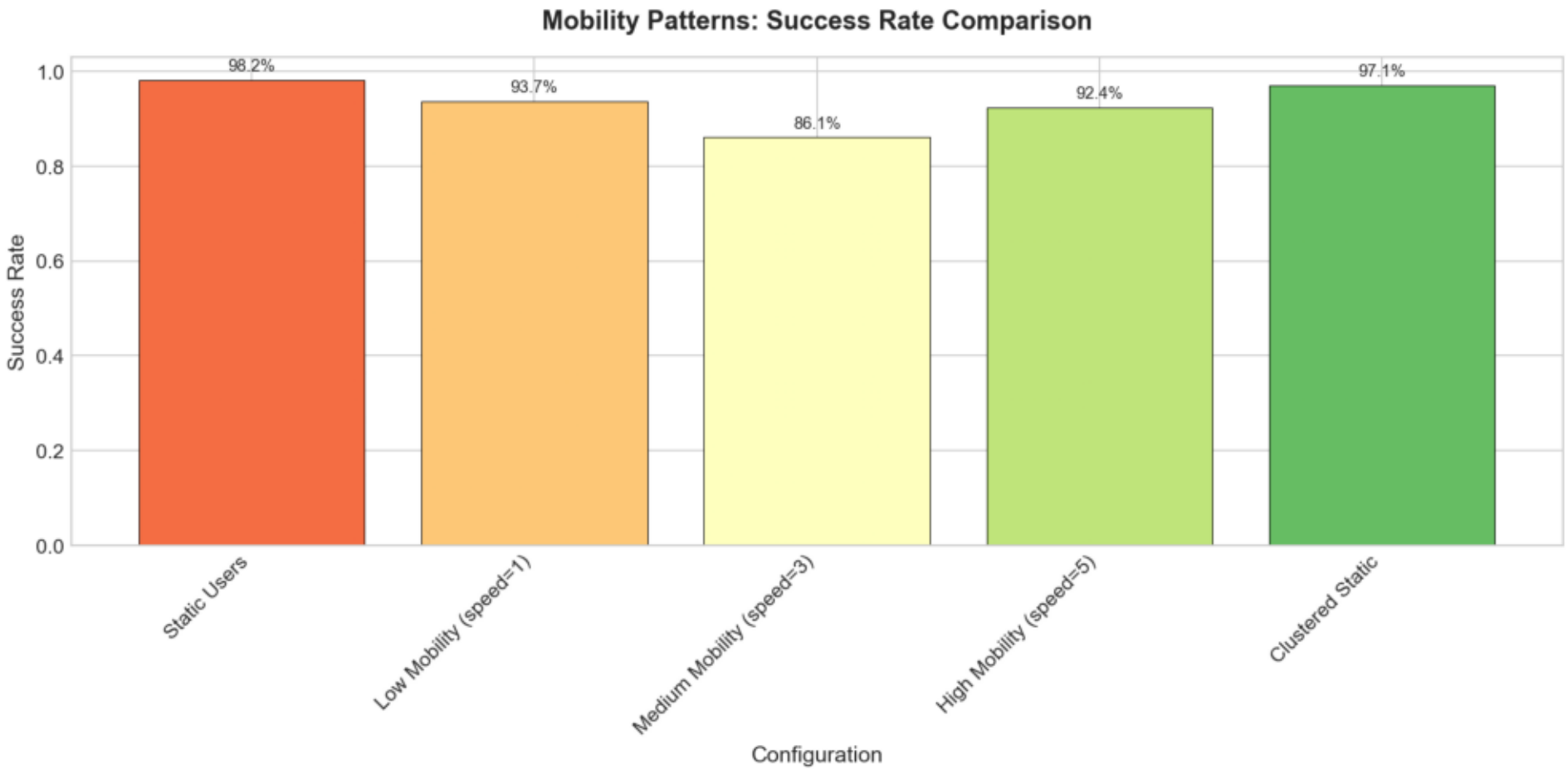
Strategy	Tasks	Success	Latency (s)	QoS	Energy (J)
Default (Load Balance)	753	100.0%	0.17	69.85	2488.00
Energy-First	467	98.3%	0.27	64.67	2506.00
Latency-First	601	98.7%	0.23	71.71	2806.00
Balanced	509	91.9%	0.31	60.90	3110.00
Utilization-Based	583	99.5%	0.17	63.81	1962.00

UAV Positioning Strategies



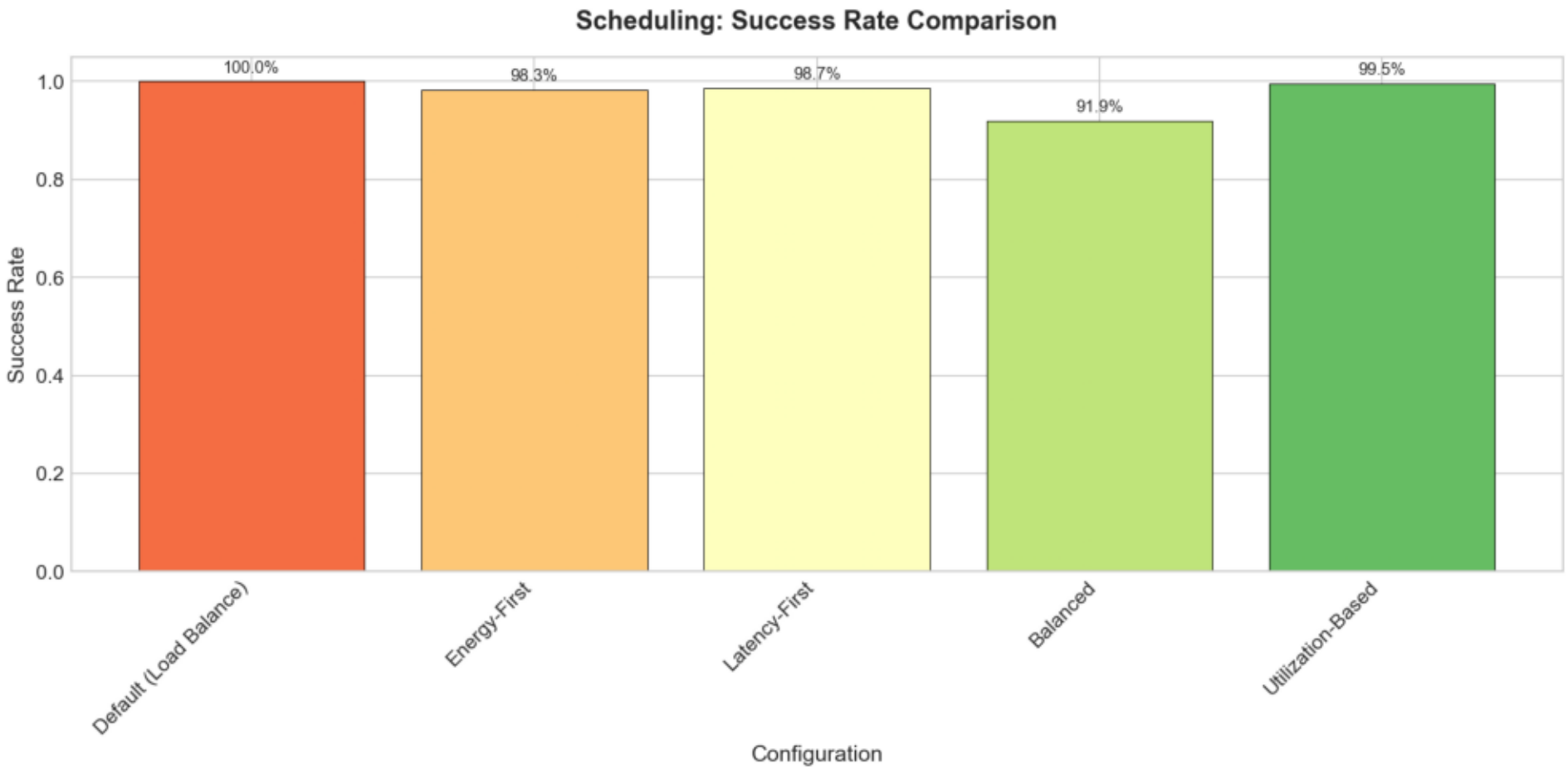
Success rates for different UAV placement strategies

User Mobility Impact



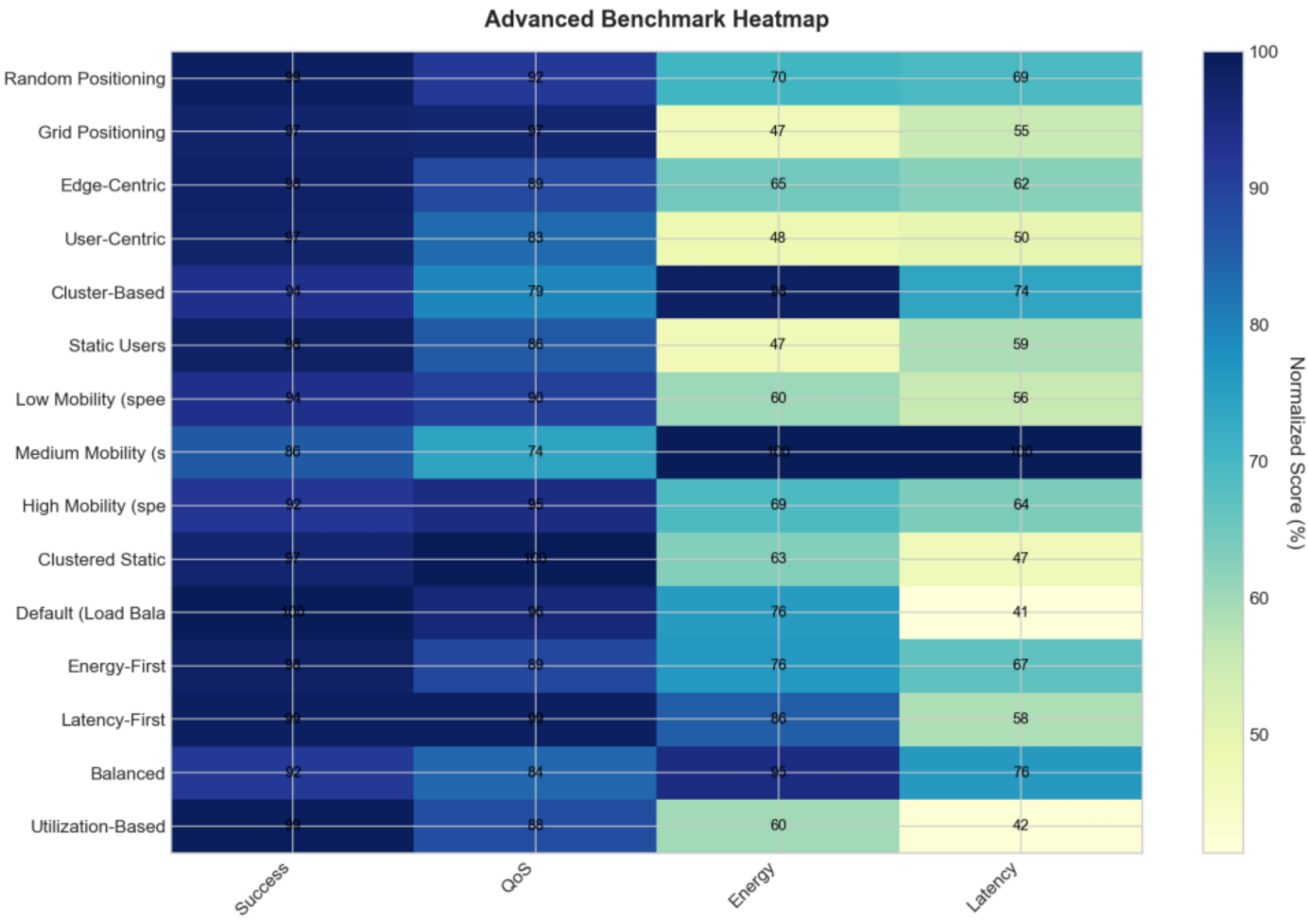
Effect of user movement patterns on task success

Scheduling Algorithm Comparison



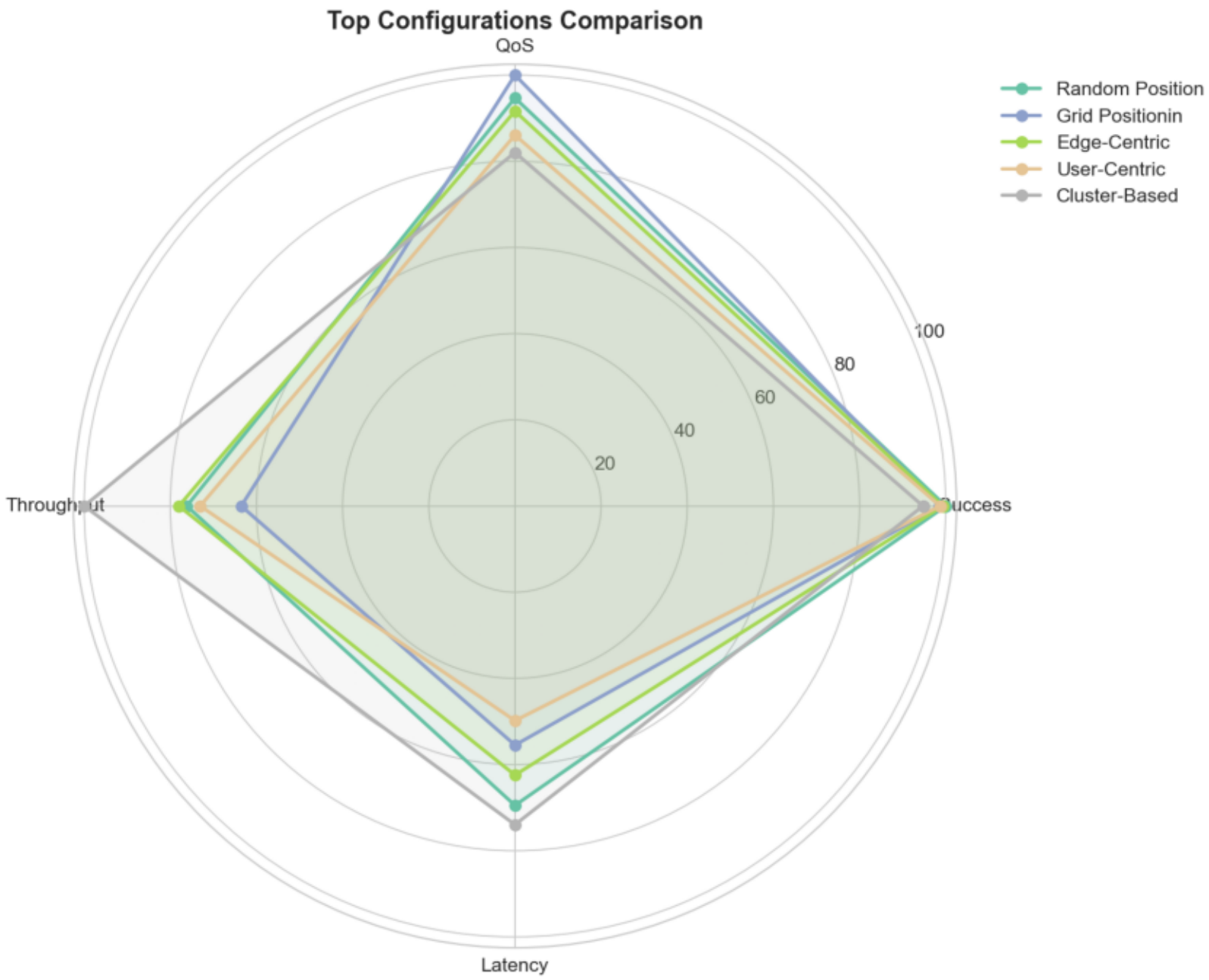
Performance of different scheduling strategies

Performance Heatmap



Normalized metrics across all configurations

Top Configurations



Radar comparison of best performing configurations

Thank You

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