**MAMA Framework Scalability Stress Test Results** Registrar Service Throughput vs. N Semantic Matching Latency vs. N 75000 70000  $3 \times 10^{1}$ Semantic Matching Latency (ms)

x

0

10 65000 40000 35000  $10^{1}$ Trend: O(N^0.11)  $10^1$ 10<sup>2</sup> 10<sup>3</sup> 10<sup>3</sup>  $10^{1}$ 10<sup>2</sup> Number of Agents (N) Number of Agents (N) **MARL Decision Latency vs. N Comparative Performance Impact** Semantic Matching (normalized) 1.0 Registrar Throughput (inverted) MARL Decision (normalized) 0.08 Normalized Performance Impact MARL Decision Latency (ms) 0.02 0.0 0.00 10<sup>3</sup>  $10^{1}$ 10<sup>2</sup> 10<sup>3</sup> 10<sup>1</sup>  $10^{2}$ Number of Agents (N) Number of Agents (N)