Expressive Commerce and Its Application to Sourcing: How We Conducted $25 Billion of Generalized Combinatorial Auctions

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Abstract

Sourcing professionals buy several trillion dollars worth of goods and services yearly. We introduced a new paradigm called expressive commerce and applied it to sourcing. It combines the advantages of highly expressive human negotiation with the advantages of electronic reverse auctions. The idea is that supply and demand are expressed in drastically greater detail than in traditional electronic auctions, and are algorithmically cleared. This creates a Pareto efficiency improvement in the allocation (a win-win between the buyer and the sellers) but the market clearing problem is a highly complex combinatorial optimization problem. We developed the world's fastest tree search algorithms for solving it. We have hosted $25 billion of sourcing using the technology, and created $3.2 billion of hard-dollar savings plus numerous harder-to-quantify benefits. The suppliers also benefited by being able to express production efficiencies and creativity, and through exposure problem removal. Supply networks were redesigned, with quantitative understanding of the tradeoffs, and implemented in weeks instead of months.

URL for the paper:
http://www.cs.cmu.edu/ sandholm/Expressive%20commerce.aimag.pdf

BIO:

Tuomas Sandholm is Professor in the Computer Science Department at Carnegie Mellon University. He received the Ph.D. and M.S. degrees in computer science from the University of Massachusetts at Amherst in 1996 and 1994. He earned an M.S. (B.S. included) with distinction in Industrial Engineering and Management Science from the Helsinki University of Technology, Finland, in 1991. He has published over 250 technical papers on electronic commerce; game theory; artificial intelligence; multiagent systems; auctions and exchanges; automated negotiation and contracting; coalition formation; voting; safe exchange; normative models of bounded rationality; resource-bounded reasoning; machine learning; networks; and combinatorial optimization. He has 17 years of experience building optimization-based electronic marketplaces, and several of his systems have been commercially fielded. He is also Founder, Chairman, and Chief Scientist of CombineNet, Inc., which has fielded over 400 large-scale generalized combinatorial auctions. He received the National Science Foundation Career

Award in 1997, the inaugural ACM Autonomous Agents Research Award in 2001, the Alfred P. Sloan Foundation Fellowship in 2003, and the IJCAI Computers and Thought Award in 2003.