

ITR-Rapid Response Electronic Markets for Time-Sensitive Goods

PROJECT SUMMARY:

The Problem

Most companies are using online channels for buying and selling goods and services, and a recent report by the Gartner Group expects online B2B activity to reach \$6.3 trillion in 2005. The Internet has emerged as a particularly appropriate marketplace for time sensitive goods. Time sensitive goods have an associated time attribute. Examples include aircraft landing time slots, tickets to entertainment events and hotel rooms on a particular day. Before time-sensitive goods can be extensively traded in eMarketplaces, new market mechanisms and rapid response IT technologies are needed to handle these goods in an online environment, and to enable the market agents (buyers and sellers) to reach “equilibrium” quickly, i.e. determine who buys, who sells and at what time.

Challenge

Time-sensitive goods may be subject to a number of different market equilibria as time passes. Market participants come and go rapidly, especially in online marketplaces, and decisions have to be made without complete information. Further, there are a multiplicity of buyers, sellers and traders, who may all be distributed in multiple spatially disparate locations while interacting through an online medium. In many cases, there are exponentially large possibilities for combining these time-sensitive goods in multiple dimensions. Finally, a number of infrastructure performance constraints arise in these settings.

Specific Tasks:

1. *Design of Market Structures and Mechanisms*: Modeling of markets for different time-sensitive goods under a number of conditions, and deriving computationally efficient market clearing algorithms and market agent algorithms.
2. *Design of Data Delivery Systems*: Designing systems for delivering appropriate and timely data for all decision makers.
3. *Research on Market Software Agents*: Analysis and design of software agents that represent market participants.
4. *Empirical Analysis of Electronic Markets*: Empirical analysis to gain a fundamental understanding of time sensitive goods and their marketplaces, and to test the market mechanisms, software agents and data delivery mechanisms that will be developed in (1) to (3) above.

Significance

The proposed research will examine a completely new kind of electronic market that has not been studied extensively to date. This research should contribute to the micro-economics and mathematical programming literature. The nuances of integrating marketplaces for time-sensitive goods in an online environment will contribute to the design of data delivery systems. We intend to use agent technology to aid in the process of market making and obtaining equilibrium solutions rapidly. As such, we will also contribute to research in multi-agent systems because time-sensitive markets will require significant changes in the fundamental propositions governing agent behavior.

Team and Deliverables

The research will be carried out by a multidisciplinary team of researchers from Management Science, Economics and Computer Science, and will include collaborators from industry: Avendra, GE Global Exchange and IBM. Our research results will contribute to scholarship in each of these fields. We will also incorporate our results into prototype eMarkets for time-sensitive goods, and test it in the commercial environment of our industry collaborators. A report on the integrative effort will be useful for technology transfer into industry.