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Editorial

Special section guest editors' introduction: Evaluating new technological innovations for successful business on the internet

The pace of research in electronic commerce continues to increase, while staying on track with its original goal. That goal is to create a global market place where people with surpluses and needs can conduct exchanges with others who have complementary needs and surpluses. Negotiation preceding this exchange consists of an exchange of bids, and this exchange of information must be secure, reliable, engaging, informative, and efficient, in order to allow the global marketplace to increase the welfare of all participants.

This special section features five papers selected from the best submissions to the Eighth International Conference on Electronic Commerce (ICEC), held in Fredericton, New Brunswick, Canada in August of 2006. In addition to discussing recurring challenges in electronic commerce, such as B2B electronic commerce, mobile commerce and the semantic web, this year's installment featured a special theme on "Innovations for Conquering Current Barriers, Obstacles and Limitations to Conducting Successful Business on the Internet," and introduced a new track on "Privacy, Security and Trust" designed to tackle these arising issues. A special "Business Brokerage Session" was also featured, which aimed to bridge the gap between academic research and current and future needs and trends emerging in industry. In all, 113 submissions were received from 16 countries representing North America, Europe, Asia and Australia. From the best of those selected for presentation at the conference, nine papers were invited for submission to this special section. After another lengthy review process, five papers were ultimately chosen for inclusion. Conference submissions were reviewed by at least three highly knowledgeable and respected members of the ICEC International Program Committee, and submissions invited to for this special section endured an additional review process involving at least three rounds of revisions. As a result of this rigorous and selective process, we are confident that the papers you will read in the following pages offer a high-quality representation of the innovative and stimulating work that is showcased at ICEC each year.

Security is always a concern in an online marketplace, which differs from a face-to-face marketplace in that some of the usual assurances of good faith bargaining are missing. But, as the authors of the first two papers show, they can be replaced by assurances that communicate the marketplace is verifiably trustworthy, and that reputations of sellers cannot be falsely increased. The first paper, entitled "Practical Secrecy-Preserving, Verifiably Correct and Trustworthy Auctions," by David C. Parkes, Michael O. Rabin, Stuart M. Shieber and Christopher Thorpe, presents a cryptographic approach to conducting auctions that can maintain the secrecy of bids, but at the same time can be proven to be fair. There are two key effects of this technology. Since bids cannot be examined

during the auction by the auctioneer, and winner determination is verifiably correct, the possibility of corrupt activity on the part of the auctioneer, such as revealing bids to colluders or modifying bids for personal gain, is eliminated. The technology also reduces the risk of bidder collusion, such as the use of bidding rings where a number of bidders agree to bid in a certain way, since the verification of fairness requires no public revelation of bids. This alleviates the threat of punishment for deviating from the ring, and allows bidders to instead behave in a self-interested manner. As a result of this reduction in unethical or corrupt activity, auctions utilizing this technology become more efficient, attracting more participants and driving up overall social welfare.

Jie Zhang and Robin Cohen tackle the issue of computational trust in their paper, "Evaluating the Trustworthiness of Advice about Seller Agents in E-Marketplaces: A Personalized Approach." In this work, the authors study an agent-based marketplace in which buyers may query other buyers for their opinions on various sellers, and examine how to quantitatively determine the trustworthiness of the elicited advice. Here, each agent has a representation of its opinion of each seller with which it has interacted, and can share this opinion when asked. The requesting agent can choose whether to trust this advice based on the similarity of its own ratings and those of the advisor's for commonly rated sellers, as well as those in common with the general population of buyers. As a result of this balance, the approach is demonstrated to be effective both when markets are unusually small, as well as when buyers have very few commonly rated sellers. The authors also show that the approach performs well even when the majority of advisors provide large numbers of unfair ratings, which has not necessarily been the case in previous methods studied.

To meet the goal of being informative, the marketplace is required to become more expressive. Utility theory continues to be the basis for consumer and business evaluations of goods and services. A new trend in this area is to include software services in the set of commodities that can be consumed and exchanged, as discussed in the third and fourth papers. Services in general are highly configurable; unlike goods, they cannot be mass produced and delivered in bulk. Thus when services are involved, more of the overall effort is spent in negotiation.

Exchanging both expressive bids and functions for evaluating those bids can be one way to reduce that effort. Steffen Lamparter, Anupriya Ankolekar, Daniel Oberle, Rudi Studer and Christof Weinhardt, in their article, "Semantic Specification and Evaluation of Bids in Web-based Markets," rely upon the precision of description logic for representing bids that can be mutually understood by the participants, and upon semantic web technologies to exchange the bids. They exchange bid evaluation functions, or

policies, generalizing the usual protocol of exchanging bids consisting of a description of goods and a single price, and thus further reduce the amount of negotiation necessary. Their ontology is built in layers, and in this paper they contribute a layer for modeling policies and a layer for domain-specific pricing information. They allow the exchange of piecewise linear functions that represent policies for evaluating the multi-attribute utilities of configurable goods and services. Moreover, they contribute a prototype that finds all services that satisfy a given bid, from which selected services can be invoked.

Services are delivered, not in bulk, but through sustained effort on the part of the service provider. Changes to the environment or additions to the set of requests may require the server to revoke some of the agreements that were negotiated. Within a virtual organization, where the partners may agree on a set of policies for priority governing shared resources, revoking agreements may be perfectly acceptable in certain circumstances. To ensure compliance with shared policies, these constraints must be expressed in a language that is both implementable and sharable, so that all can agree upon them. Alun Preece, Stuart Chalmers, Craig McKenzie, Jeff Z. Pan and Peter Gray in our fourth paper, "A Semantic Web Approach to Handling Soft Constraints in Virtual Organizations," explore the use of soft constraints for expressing priorities. They provide a "Constraint Interchange Format," based on the semantic web languages OWL and SWRL. Soft constraints are appropriate for expressing policies, since they can be violated if necessary. Again utility theory is used; here utilities express the strength and priorities of constraints so that constraint violations will be minimally disruptive. The authors provide a prototype illustrating their use of constraints for controlling the delivery of multimedia as a service.

Because the online market requires more information about an individual than a face-to-face market, there is a legitimate privacy concern that the information given to one business partner is not exposed to others, especially when the commodity being traded is information itself. We cap off our special section with an article that provides an assessment of the acceptance and usage of an established representation that has long been a standard. In their paper, entitled "P3P Deployment on Websites," Lorrie Faith Cranor, Serge Egelman, Steve Sheng, Aleecia M. McDonald, and Abdur Chowdhury offer a comprehensive account and analysis of the adoption of the W3C's Platform for Privacy Preferences as a representation for privacy policies on the web. In their study, they found that while adoption of P3P has been slower than expected, it continues to grow at a steady rate. Two factors that appear to positively affect the likelihood of P3P usage among websites are popularity, where click-rates for the 8.5% of 30,000 sites studied using P3P account 16.67% of the traffic, as well as having an electronic commerce element. Due to differing privacy laws and attitudes around the world, the authors also uncovered interesting geographical trends. For example, they found that sites hosted by the European Union where far less private information is typically collected, were less likely to share collected data or use it for marketing purposes, than their non-European Union counterparts. Another interesting discovery offered is the high rate of mismatches between web sites' P3P representations and corresponding natural language policies. Many differences were explained by minor syntax errors that did not affect the readability of the P3P policy, however, a large number of semantic mismatches were also detected. Their cause was often that the text version of the policy was overly vague.

Based on the experience of research efforts such as the P3P project, researchers currently working to develop new representations

for use in electronic commerce can learn some valuable lessons. Web content is generated at alarmingly high rates, and as a result of the consequential need to generate and update web sites and services at a high rate of speed, producers of web technology will invariably choose the path of least resistance. In the case of content generation, the fastest and most effortless medium of choice is simply text. For example, Cranor et al. found that most web sites chose to display their privacy policies in a text-based format, rather than to utilize the structured representation of P3P. The researchers working on this study found no evidence that this choice was due to any shortcomings inherent in P3P. On the contrary, it is the opinion of those researchers that a high number of web sites would likely adopt their technology, if they were forced to make use of some sort of machine-readable representation via legislation or otherwise. However, until this need is there, the majority will choose to display their policies in plain text. The fact that 10–20% of web sites have chosen to make use of P3P despite this legislation says great things about the technology. Semantic web researchers face similar challenges in their quest for wide-scale adoption. While the advantages of semantic web technology are well-documented, there is as yet insufficient incentive for the majority of creators of web content to devote the effort to add markup and make their content semantic web-compatible. In order for any type of representation to gain widespread acceptance, the benefits of the technology must clearly outweigh the costs of implementation. We feel that the authors of all five papers in this special section more than sufficiently demonstrate the superiority of their respective technologies, and make their improvements on the current state of electronic commerce difficult to ignore.

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