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Research Spotlights

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Research Spotlights

Examining the Continuance of Secure Behavior: A Longitudinal Field Study of Mobile Device Authentication (p. 219)

Paul John Steinbart, Mark J. Keith, Jeffry Babb

It is not enough to get information technology users to adopt a secure behavior. They must also *continue* to behave securely. However, if secure behaviors are difficult to practice, it is not surprising that technology users will abandon them or find ways to subvert policies. For example, in the context of password authentication, login success rates may determine whether users continue to use a strong credential or switch to less secure behaviors (e.g., storing a credential or changing to a weaker, albeit easier to successfully enter, credential). This is particularly concerning given the shift toward mobile devices in the workplace that present opportunities for both increased value and risk. Mobile devices are based on a small user interface and keypad that present challenges to users. Therefore, it is possible that mobile device usage may lead to poorer text-based authentication practices. We conduct a longitudinal field experiment to test our predictions and find that the mobile interface does reduce login success rates. In turn, these failures lead to discontinuance of a secure behavior and the adoption of less-secure behaviors. Alarmingly, this effect does not seem to disappear with increased practice using a mobile interface. In fact, our results indicate that more practice with a mobile interface appears to only lead to an increase in poor security behaviors over time.

Sustainability of Healthcare Information Exchanges: A Game-Theoretic Approach (p. 240)

Emre M. Demirezen, Subodha Kumar, Arun Sen

Which factors impact the sustainability of healthcare information exchanges (HIEs) and the participation levels in these networks the most? There has been substantial progress to make HIEs a reality, however, challenges and barriers remain—most notably sustainability and adoption levels. Based on their interactions with the key personnel of different HIE providers, the authors develop models and find that if the heterogeneity among healthcare practitioners (HPs) (in terms of their expected benefit from the HIE membership) is high, some low-gain HPs choose not to join HIEs. The authors further find other counter-intuitive results. For example, increasing the highest benefit the HPs can get from the HIE might decrease the number of participating HPs in the HIE. Therefore, the authors explore several measures that can encourage more participation in these networks and find that it might be beneficial to establish a second HIE in the region, propose more value to the low-gain HPs, or offer and/or incentivize HIE related value-added services.

The insight for the government and HIE providers: seemingly reasonable actions or incentives might even hurt participation in HIEs, however, there are several different opportunities for the government and HIE providers for improving sustainability and participation levels.

Does Product Market Competition Drive CVC Investment? Evidence from the U.S. IT Industry (p. 259)

Keongtae Kim, Anandasivam Gopal, Gerard Hoberg

In recent years, almost every large tech company, including Intel and Google, has its own corporate venture capital (CVC) funding unit. These units aim to exploit novel ideas from promising startups at an early stage. Intel alone is expected to invest more than $500 million into young tech companies in 2015. In this study, we focus on one particular factor, product market competition, as a driver of CVC as a part of an information technology (IT) firm's innovation strategy. Using novel dynamically-updated measures of product market competition based on verbal product descriptions from firm 10-K statements, we investigate how product market competition during the period 1997–2007 relates to CVC spending. We first find that firms in competitive markets make higher research and development (R&D) and CVC investments. In addition, we find that increasing product market competition leads to a shift away from internal R&D spending and into CVC. These findings are significantly stronger for technology leaders, i.e. firms with deep patent stocks, in the IT industry, thus highlighting the continuing relevance of internal technological capabilities. We also find that CVC appears to be a successful way to exploit external knowledge, mainly for technology leaders, as these firms also have more patent applications.

The insight for management: CVC investment can be an effective innovation strategy for technology leaders in competitive and dynamic markets.

Product Line Extension in Consumer Software Markets in the Presence of Free Alternatives (p. 282)

Aaron Baird, Chadwick J. Miller, T. S. Raghu, Rajiv K. Sinha

The current environment faced by incumbents in the software industry is hypercompetitive. Not only do these organizations face high piracy rates (a 2011 study found that 50% of computer users admitted to pirating software), but they also must compete with widely available free alternatives. In this research, the authors investigate ways that incumbents can use piracy controls and vertical product extensions to maximize consumers' willingness to pay (WTP) for a focal software product. In two controlled experiments, using a unique WTP elicitation method, the authors show that introducing a premium or free vertical product extension has different impacts on consumers' WTP for the focal product depending on whether it is a low- or high-cost market. However, piracy controls reduce the piracy rate but have a limited impact on consumers' WTP for the focal product in both contexts.

The insight for management: We observed that the highest WTP occurred with (1) virtually no piracy controls associated with the target product in a high- or low-cost market, (2) the introduction of a free product extension in the high-cost market, and (3) the introduction of a premium product extension in the low-cost market.

Framing Innovation Opportunities While Staying Committed to an Organizational Epistemic Stance (p. 302)

Anne-Laure Fayard, Emmanouil Gkeredakis, Natalia Levina

Organizations face multiple opportunities offered by new digital technologies promising to generate novel insights. A big management challenge is how and when to act on such opportunities. This qualitative study focuses on crowdsourcing for innovation and examines how two consulting firms have considered crowdsourcing as a new way of pursuing knowledge. When exploring and evaluating crowdsourcing, both organizations implicitly relied on their culture and exhibited strong attitudes towards what counts as knowledge and how to pursue novel insights, what the authors define as organizational epistemic stance. Each organization had a different epistemic stance. The study elaborates how commitment to these different stances influenced the way they examined and evaluated crowdsourcing as an alternative for generating knowledge. Commitment to an organizational epistemic stance does not necessarily mean inertia and rejection of seemingly incompatible new practices. It can also be generative of new opportunities as, for example, one of the organizations studied constructed and implemented a new way of doing crowdsourcing for innovation.

The insight for management: When encountering digitally-enabled opportunities to generate new knowledge, such as crowdsourcing and big data analytics, managers need to consider carefully the implicit influence of their attitudes to generating knowledge on framing these decisions.

Facilitating the Transformational: An Exploration of Control in Cyberinfrastructure Projects and the Discovery of Field Control (p. 324)

Gregory D. Moody, Laurie J. Kirsch, Sandra A. Slaughter, Brian Kimball Dunn, Qin Weng

How can large cyberinfrastructure projects be effectively controlled? Cyber projects are complex, massive, and ambitious, often involving hundreds of academic, government, and industry professionals, requiring years of development, and costing millions of dollars. Based on a longitudinal study over eight years of the Network for Earthquake Engineering Simulation and the Global Environment for Network Innovation, we observe that initially select users in the respective field champion the project. These users rally support from their disciplines, related areas, and the government for funding purposes. After the project is initiated, a more bureaucratic approach to control is adopted by the project, backed by the sponsoring agency. Once construction begins and the project users understand the implications and promise of the project, we observe that the main users of the project exert more control over the project, which is also supplemented by the bureaucratic control exerted by the sponsoring agency.

The insight for management: large complex projects are best controlled by those that have the most interest in their success, rather than strict adherence to traditional project management techniques, which may hamper the commitment of these key individuals that motivate the entire field to continue supporting the project.

Characteristics and Economic Consequences of Jump Bids in Combinatorial Auctions (p. 347)

Pallab Sanyal

Jump bidding, which refers to bidding above the minimum necessary, is a robust behavior that has been observed in a variety of ascending auctions in the field as well as the laboratory. However, the phenomenon has yet to be studied in combinatorial auctions, which are a type of multiobject auction that allows bidders to bid on a set of objects. These

auctions have been used or proposed to be used in a variety of applications, including the auctioning of the rights to use railroad tracks, airport time slots, bus routes, industrial procurement, procurement of school meals, and most notably, the allocation of spectrum rights. In this paper, we explore jump bidding behavior in combinatorial auctions as a function of design choices of the mechanism. We find that the nature of the prices that the auctioneer chooses to offer as feedback to the bidders can considerably influence their jump bidding behavior, leading to significant differences in auction outcomes. In particular, our study reveals that in the cognitively challenging package-bidding environment bidders often pursue computationally frugal but suboptimal heuristics. We offer actionable recommendations to mechanism designers concerning the design of combinatorial auction based on their economic objectives.

On the Ontological Quality and Logical Quality of Conceptual-Modeling Grammars: The Need for a Dual Perspective (p. 365)

Roger Clarke, Andrew Burton-Jones, Ron Weber

A core activity in information systems development involves building a conceptual model—also known as a conceptual modeling (CM) script—of the domain that an information system is intended to support. Such scripts are created using a CM grammar. One way a CM script can be of low quality is by being imprecise—that is, through lack of information, it fails to answer users' questions about the domain. We show that approaching semantics from a logical perspective (complementary to the well-established ontological perspective) allows us to rigorously determine whether a CM script is imprecise and thereby whether a CM grammar produces imprecise scripts. Concretely, we prove that a certain fragment of the Entity-Relationship modeling grammar, subject to a limited number of modifications, will never produce imprecise scripts.

The insight for information systems professionals is that in evaluating the semantics of CM grammars and scripts, they should use the largely neglected resources of logic as well as ontology. More generally, we open up a new area for research on the logical quality of CM grammars and demonstrate the importance of taking a dual perspective—both ontological and logical—to improving the semantics of CM grammars and scripts.

Research Note: Leader Influence on Sustained Participation in Online Collaborative Work Communities: A Simulation-Based Approach (p. 383)

Wonseok Oh, Jae Yun Moon, Jungpil Hahn, Taekyung Kim

Do leader behaviors matter to the sustainability of online collaborative work communities (e.g., Wikipedia, open source software development groups)? Can leaders affect membership dynamics through their relational style towards community participants? Should a leader treat all members equally regardless of performance or exercise a differential leadership in which members are provided with unequal resources and opportunities depending on their contribution? The effectiveness of this uniform versus differential leadership style is particularly important for such online collectives where peer effects significantly influence member retention and sustained participation. The authors developed agent-based simulation models of online collaborative work communities based on the following key elements found to influence membership dynamics—environmental forces that attract members away from the collective, interpersonal influence among participants, network structure of participant collaborative ties, community size and the life cycle phase of community evolution. The model parameters were set to vary based on empirical observations of real world online collaborative work communities. They find that the differential leadership style is more effective when environmental uncertainty that demotivates members from sustaining membership increases. However, given that the effectiveness of such supervisory behaviors diminishes as the collective expands, leaders should maintain high relationship quality with members in such growing communities. Leaders should also adjust their contributions as the community evolves and as the collaboration network structure evolves based on leader and member interactions.

The insight for management: To sustain online collaborative work communities, leaders should adopt a contingency approach by which they flexibly employ "optimal" supervisory mechanisms depending on environmental stability, community characteristics, and peer effects.

Research Note: Are Online Labor Markets Spot Markets for Tasks? A Field Experiment on the Behavioral Response to Wage Cuts (p. 403)

Daniel L. Chen, John J. Horton

The proliferation of online labor markets such as Amazon's Mechanical Turk has raised questions about how the buyers and sellers in these markets act. Do participants think of themselves as parties to an arm's length business services contract, or do they think of the relationships formed as being more like employment contracts? In this paper, the authors report the results of an experiment designed to elucidate the worker's views, by seeing how they respond to price changes. The authors hired workers to do some task and then offered them the opportunity to keep working, albeit at a lower wage. Consistent

with them having an employment-like view, workers reacted negatively by quitting, though this effect strongly was moderated by different "justifications" for the wage cut, highlighting the importance of fairness considerations in worker-decision making.

The insight for management: despite the short duration and seeming anonymity of online labor transactions, workers have employee-like attitudes about wages—and presumably other factors relevant to the relationship.

Research Note: Content and Collaboration: An Affiliation Network Approach to Information Quality in Online Peer Production Communities (p. 424)

Gerald C. Kane, Sam Ransbotham

Using the specific case of medical information, we investigate information quality on Wikipedia. We find that the quality of information is not only related to the contributors who develop the information, but it is also related to the other information its contributors work on as well. An important implication is that Wikipedia (and other types of online platforms that companies and customers are increasingly adopting for collaboration) should not be treated as independent efforts. Rather, they represent an information ecosystem in which the contributors and projects intimately relate to one another and should be evaluated and managed as such. We also explore how to identify quality information on these types of platforms. Using a team of medical school students, we validate that Wikipedia's self-assigned measures are a reliable indicator of information quality. While not all the information the Wikipedia community creates is high quality, the community can identify which information is. We also explored whether crowdsourced Amazon's Mechanical Turk ratings could be a reliable source of assessing information quality, finding that these quality ratings only capture easily identifiable content characteristics, such as article length and writing style.

Research Note: An Internet-Enabled Move to the Market in Logistics (p. 440)

Fengmei Gong, Barrie R. Nault, Mohammad S. Rahman

Logistics outsourcing has increased with the commercialization of the Internet, implying a reduction in the corresponding transaction costs. We hypothesize that the Internet has reduced external transaction costs relatively more than internal governance costs, and we examine whether the commercialization of the Internet coincided with a move to the market in logistics—one of the most connected industries in the economy. We find that the effects of information technology (IT) on outsourced logistics have changed in the post-Internet era. After the commercialization of the Internet, an industry's own IT investment and outsourced logistics became complements whereas they were not before. Consequently, industries favored the market form of the provision of logistics. We also find similar impacts of customers' IT investments on a focal industry's outsourced logistics. Previous studies argued that IT led to the shift from hierarchies to markets, or provided indirect evidence through measures of firm size or integration. Our study provides systematic empirical evidence to support that the Internet enabled a move to the market in the provision of logistics.

Research Note: Gamification of Technology-Mediated Training: Not All Competitions Are the Same (p. 453)

Radhika Santhanam, De Liu, Wei-Cheng Milton Shen

Gamification, the addition of game elements to non-entertainment settings, is a way to add fun and engagement in interactions with technology systems at work. Many organizations are gamifying their systems. This research study illustrates the challenges in the design and use of gamification systems by examining a popular game design element, competition, in an e-learning environment. The study finds that trainees who faced a lower-skilled competitor reported better learning outcomes and are more confident of their abilities, whereas trainees who faced equally-skilled competitors reported higher levels of engagement. Thus, there may not be a one-size-fits-all competitive gamification design. The study findings suggest that addressing the engagement and task goals of gamified system simultaneously may not be an easy task, and must be paid close attention in the design of the system. Monitoring and personalization of user interactions with technology could help address the issue and achieve the goals of gamification—an engaged and productive experience with technology.