



Information Systems Research

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

Research Spotlights

To cite this article:

(2018) Research Spotlights. Information Systems Research 29(1):iii-vi. <https://doi.org/10.1287/isre.2018.0782>

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<https://doi.org/10.1287/isre.2018.0782>

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Research Commentary: Mind the Gap: Accounting for Measurement Error and Misclassification in Variables Generated via Data Mining (p. 4)

Mochen Yang, Gediminas Adomavicius, Gordon Burtch, Yuqing Ren

The availability of big data, together with the application of predictive data mining techniques, provide researchers with growing opportunities to extract valuable information from large amounts of data. Examples include the use of text mining techniques to determine the sentiment of text and the use of image classifiers to predict an individual's gender or race from a profile picture. Recent practice in both academia and industry have sought to combine data mining with traditional econometric analyses. Typically, data mining methods are first used to generate new variables (e.g., text sentiment), which are added into subsequent econometric models as independent variables. However, because prediction is almost always imperfect, variables generated from the first stage data mining models inevitably contain measurement error or misclassification. These errors, if ignored, can introduce systematic biases into the second stage econometric estimations and threaten the validity of statistical inference. Fortunately, the evaluation of the first stage data mining models also produce predictive performance metrics, which serve as a reliable quantification of measurement error. Using such information, we demonstrate how researchers can correct for the estimation biases. We also offer clear and actionable guidelines to help researchers to adopt this combined methodology in a robust manner.

Quantifying the Impact of Social Influence on the Information Technology Implementation Process by Physicians: A Hierarchical Bayesian Learning Approach (p. 25)

Haijing Hao, Rema Padman, Baohong Sun, Rahul Telang

How to improve information technology implementation at the physician level has been a big challenge in healthcare organizations. In this study, we find that both targeted early adopter effects and general peers, particularly the early adopters, have significant impacts on their colleagues' technology usage based on our examination of a 22 months' panel data of 192 physicians from a community health system. Our policy

simulations suggest that technology implementation probability would increase: by 15% by adding an early adopter to a group without early adopters, by 25% by adding a peer to solo users, or by 47% by adding an early adopter to solo users. Those results are exciting because the first result suggests that organizations can target some physicians to train them to be early adopters, then once those early adopters implemented the new technology into their daily work, they would naturally influence their colleagues to implement the new technology subsequently. The second result suggests that forming physicians into groups also will help physicians improve their technology implementation relative to solo users. The third result suggests that forming groups and also training early adopters can improve the technology implementation rate remarkably. Those results are generalizable across technologies or organizations.

Managing Distributed Product Development Projects: Integration Strategies for Time-Zone and Language Barriers (p. 42)

Edward G. Anderson Jr., Aravind Chandrasekaran, Alison Davis-Blake, Geoffrey G. Parker

Increased globalization has led firms to distribute complex product development efforts across the world. In this research, we first analyze interview data from 70 such projects in 14 countries, which involve team members who speak 10 different languages. We find that time-zone and first-language differences can create major coordination issues. Our interviews also suggest that the commonly discussed solutions, such as workforce colocation or modular product design, are frequently insufficient to coordinate distributed projects. Instead, our sample's firms also invest in two new coordination strategies. One is developing specialized information systems to facilitate joint product design between partners. The other is empowering their project managers by increasing their scope of responsibilities to include both engineering and purchasing decisions. Then, we used survey data from 55 distributed projects at 20 firms to investigate how these two strategies impact project outcomes including cost, quality, responsiveness, and relationships. Our findings suggest that both coordination strategies can improve project outcomes along some dimensions but can also worsen them along other dimensions. Overall, we find there is no single "silver bullet" to manage

coordination challenges with suppliers during product development. Instead, firms must combine multiple coordination strategies while also carefully balancing those strategies' tradeoffs.

When Ignorance Can be Bliss: Organizational Structure and Coordination in Electronic Retailing (p. 70)

Dengpan Liu, Yong Tan, Vijay Mookerjee

The core of the problem studied in this paper is essentially about the mismatch that occurs in how other departments in a firm view the true capabilities of the information technology (IT) function. Normally, in an organization, the detailed operations of the IT department are not visible to other departments. Thus, these departments make decisions based on assumptions on how they perceive the IT department to work. Of course, if the firm is centralized, decisions can be taken with full visibility. When centralization is possible (either explicitly as a structural choice or by implementing coordination schemes to achieve centralized behavior), there is no mismatch between the perceived service quality of the IT department and its actual service quality. In decentralized scenarios, some mismatch is inevitable. In a monopoly, the results are expected: the mismatch always leads to a loss for the firm. Thus we should not expect to see the mismatch to occur in a monopoly. In a duopoly, the mismatch could be present at equilibrium. In other cases, the mismatch could be eliminated at equilibrium but be harmful for the firms as in the case of a prisoners' dilemma. In practice, the results in our study could be used to guide companies to develop IT governance strategies in the face of competition. For instance, if the marketing departments of two competing companies are both moderately pessimistic about IT's ability to serve traffic, these firms are better off with less coordination between marketing and IT. On the other hand, if the marketing departments of two competing companies are both moderately optimistic about their respective IT capabilities, they should be encouraged to coordinate more with IT.

Effects of Online Recommendations on Consumers' Willingness to Pay (p. 84)

Gediminas Adomavicius, Jesse C. Bockstedt, Shawn P. Curley, Jingjing Zhang

We explore the question of whether personalized product recommendations significantly impact the amount consumers are willing to pay for products, regardless of the accuracy of the recommendations. In a series of experiments with purchases of digital songs, we found strong evidence that the amount a consumer is willing to pay for an item can be swayed 7%–17% for every one-star change in the personalized five-star rating of a recommended product. In other words, increasing

the rating of the recommended product increases the consumers' willingness to pay for that product, and decreasing the rating has the opposite effect. These effects are observed even after consumers have had a chance to experience the product, and also when the product recommendations themselves are inaccurate. Online retailers and service providers such as Amazon.com and Netflix rely heavily on personalized recommendations to help consumers find the right products and, thus, drive sales; however, the recommendation effects we have observed can also have a significant (and perhaps unintended) economic impact both for consumers and companies. Retailers, consumers, and recommender system designers should all be conscientious of the biases that personalized recommendations can introduce in consumer decision making and purchase decisions.

Work–Life Conflict of Globally Distributed Software Development Personnel: An Empirical Investigation Using Border Theory (p. 103)

Saonee Sarker, Manju Ahuja, Suprateek Sarker

Most large companies rely on globally distributed software development to harness human capital and cost advantages. However, these practices result in serious work-life conflict (WLC) issues when workers must constantly collaborate with their coworkers across national, time zone, and cultural boundaries. Our research suggests that WLC is a key talent management issue, with important implications for how long an employee might work for the company. The findings also have implications for the general public because most activities these days are facilitated by computer applications that are often outsourced. Working conditions of those developers directly affects the quality of these computer applications. Findings suggest that supervisory support is a big factor that determines WLC of this workforce and yet we do not train managers to do this. Also, flexibility of schedules can actually increase WLC of employees. We suggest that WLC management should be a part of project management in IT outsourcing. It is important to remember that this is not a gender issue. We found that gender does not matter, but the dependent care needs do matter. The responsibilities related to taking care of dependents can mean constant juggling between the different activities in different domains, experiencing more conflict.

Information Systems Projects and Individual Developer Outcomes: Role of Project Managers and Process Control (p. 127)

Viswananth Venkatesh, Arun Rai, Likoebe M. Maruping

Psychological stress has emerged as a major problem for software developers. It has far-reaching implications for developers and organizations, including

introduction of numerous software errors, reduced overall well-being, and failure to retain talent. In this research, the authors sought to (1) understand the main information system development (ISD) project conditions that induce psychological stress in software developers, (2) identify the ISD project team activities that project managers can implement to reduce the impact of these sources of psychological stress, and (3) identify the knowledge that project managers need to possess to encourage such activities. The authors conducted a field study of 130 different ISD projects involving 1,230 developers managed by 20 project managers. The results of the research revealed that requirements changes and project complexity are two ISD project conditions that were associated with elevated levels of psychological stress and lower levels of task performance among software developers. Project managers could reduce these negative effects on software developers by enacting activities focused on (1) planning and coordination of project activities and (2) interacting with clients for whom the system is being developed. To enact such activities, project managers need to possess project management knowledge—which emphasizes how to manage a project from inception to completion—and technical knowledge—which entails understanding of the design, coding, testing, and platforms involved in building software systems.

The key insight for management is that project managers are in a position to help alleviate the psychological stress and reduced task performance experienced by software developers due to project conditions; they need to possess project management knowledge and technical knowledge to do so.

Boundary Organization Practices for Collaboration in Enterprise Integration (p. 149)

Adrian Yeow, Siew Kien Sia, Christina Soh, Cecil Chua

Many enterprise-wide transformational projects require collaboration among diverse stakeholders and span several years. However such multiparty collaboration is challenging due to divergent goals, understanding, and values among stakeholders. In our case study of a multi-year enterprise integration implementation in a large logistics organization, we discover how a dynamic formal organizational structure—boundary organization—enabled project managers to leverage formal authority and resources to motivate and coordinate collaboration in such situations. Specifically, project sponsors and managers could employ different sets of boundary organization practices and associated artifacts to address varying types of divergence that typically arise during the design, realization, and leveraging phases of the enterprise integration project. These boundary organization practices included organizing to negotiate, organizing to contain, and organizing to sustain. We also discuss the important role that

artifacts such as design documents, budgets, and enterprise systems play in not only enabling the boundary organization practices but also in making the boundary organization more durable and effective across the duration of the project.

Contextual Priming and the Design of 3D Virtual Environments to Improve Group Ideation (p. 169)

Akshay Bhagwatwar, Anne Massey, Alan Dennis

Organizations are exploring platforms that facilitate brainstorming process in ways that can improve creativity. Three-dimensional virtual environments (VEs) are such collaboration platforms where group members are represented as avatars and interact in a customizable simulated world. Microsoft HoloLens, Oculus Rift, and Samsung Gear VR are examples of recent consumer grade virtual reality tools that enable such virtual spaces and allow geographically dispersed individuals to collaborate. A key advantage of using VEs is the ease in design and redesign of collaboration space, often difficult to achieve in physical world workspaces. We investigate whether and how the design of VEs can influence the performance of groups engaged in brainstorming. To investigate this, we conducted two studies using 3D objects specifically related to the task topic in the first study and related to creativity in the second study. Compared to a VE without such 3D objects, when groups brainstormed in the VEs designed with 3D objects they generated more and better quality ideas, as well as a greater breadth and depth of ideas. As organizations explore the efficacy of VEs for collaborative work, this work may guide design and exploration of visual workspaces for brainstorming as well as tasks such as decision-making.

Generating Value Through Open Source: Software Service Market Regulation and Licensing Policy (p. 186)

Terrence August, Hyoduk Shin, Tunay I. Tunca

The primary contribution of this paper is its examination of how open-source software (OSS) licensing impacts the incentives of profit-motivated OSS contributors operating in the services market, thereby affecting an OSS originator's decision to pursue a proprietary or OSS strategy. We integrate these three facets into a single model that facilitates an understanding of the role of OSS licensing in enterprise software markets which tend to be driven by services. Given the wide range of licenses employed in the open-source domain, we study whether restrictive or permissive licenses are better for profitability and welfare. We find that in cases where an open-source contributor is adept in reaping the benefits of his own efforts to a greater extent than the originator, requiring or favoring less restrictive licenses (e.g., BSD style) can increase both

the originator's profits and welfare. However, if the originator can harness contributor efforts well and the service costs are high, a more restrictive (e.g., GPL style) license can increase developers' contributions and overall software quality.

Multigeneration Product Diffusion in the Presence of Strategic Consumers (p. 206)

Zhiling Guo, Jianqing Chen

Technological advancement has resulted in multiple generations of the same product to coexist in the consumer marketplace. The opportunity to buy a higher quality product in the future or the same product at a cheaper price attracts some strategic consumers to delay their purchase. Conventional wisdom suggests that such strategic behavior from consumers hurts a firm's sales and profit. In contrast, we find that, the effect of consumers' strategic behavior on the firm's profit and sales largely depends on the discount-to-price ratio of the first generation relative to the performance improvement of the second-generation product. When the relative discount is small, strategic waiting of consumers successfully seeds the market and significantly speeds up the sales of the second-generation product. When the relative discount is large, the discounted first-generation product cannibalizes the sales of the second-generation product. In the first scenario, the firm may benefit from consumers' strategic behavior and may induce complete substitution of the second-generation for the first-generation product to

maximize profit. We recommend the optimal pricing of the two generations of product and the optimal entry timing of the second generation. Our results offer practical insights to guide firms' multigeneration product diffusion strategies.

Reexamining the Market Value of Information Technology Events (p. 225)

Anitesh Barua, Deepa Mani

This study highlights the inability of financial markets to completely price certain classes of information technology (IT) investments when they are announced. Specifically, we find that in a period of low maturity, due to a lack of widespread knowledge of best practices and cases of success and failure, the market may find it difficult to price an event completely during the announcement period. Similarly, the challenge of acquiring and processing information on a firm's capability to manage organizational changes complementary to the IT investment may be an impediment to pricing complex IT events with a wide scope of change in the firm. In these cases, a longer-term horizon is required to assess market value. Announcement period returns are, however, reflective of event value for cases characterized by high maturity and low scope. We test our framework using a sample of 642 large outsourcing and 1,700 e-commerce initiatives. Our results are robust to alternate model specifications. We conclude with a discussion of the implications for theory and practice, and directions for future research.