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Research Spotlights

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Research Commentary: From Net Neutrality to Data Neutrality: A Techno-Economic Framework and Research Agenda (p. 253)

Robert F. Easley, Hong Guo, Jan Krämer

Net neutrality issues have been at the center of a world-wide Internet policy debate during the past decade. We discuss and categorize various network management practices, articulating whether they would be considered network neutral. We also identify five key trade-offs (affiliation, compatibility, innovation, investment, and welfare) in the context of net neutrality. Based on these insights, we argue that net neutrality, which involves an infrastructure gatekeeper, may just be part of a larger debate on data neutrality, where the gatekeeper may rather control a software platform. Examples of potential data neutrality include search neutrality, operating system neutrality, and browser neutrality. We propose a four-step techno-economic framework for analyzing data neutrality issues. In Step 1, the critical issue is to determine the market structure, which requires clearly identifying the gatekeeper and the two sides of the market (content and consumer). Step 2 involves investigation and classification of discrimination practices. In Step 3, we suggest that the initial screening for the need for data neutrality regulation should be based on two key factors: the essentiality of the data service and the market power of the gatekeeper. Step 4 involves analysis of the key trade-offs in the context of data neutrality.

Copycats vs. Original Mobile Apps: A Machine Learning Copycat-Detection Method and Empirical Analysis (p. 273)

Quan Wang, Beibei Li, Param Vir Singh

Do cypcat mobile apps displace the sales of original apps? One step back, which apps are cypcat among the millions of apps in the current iOS and Google Play app stores? Examining the cypcat app phenomenon can help resolve the ongoing debate over whether mobile app markets should keep out the clones to protect the original work. In this paper, the authors evaluate a unique panel dataset comprising 10,100 iOS game apps over five years. Using machine learning and econometric models, the authors find that cypcat apps can be both friends and foes of the original app, depending on the quality and level of deceptiveness. Although high-quality cypcat apps with dissimilar appearance

harms the original app demand, low-quality cypcat apps with resembling appearance can positively affect the demand for the original. This study provides managerial insights for original app developers. They can monitor the marketplace and set apart the potential cypcats. For the threatening and competitive cypcats that are worth suing, this study provides objective evidence to facilitate jury decisions in the lawsuit. In contrast, for the advocative cypcat apps that have strong advertising effect, the study suggests that it is unnecessary to interfere the provision of these clones.

On Direct vs. Indirect Peer Influence in Large Social Networks (p. 292)

Bin Zhang, Paul A. Pavlou, Ramayya Krishnan

Through the use of large-scale social network data, this study demonstrates that the type of peer influence (direct versus indirect) is crucial in promoting products in social networks. Because social networks can facilitate product diffusion, the type of neighbors a person has in a social network can assist companies in devising strategies to promote their products. This study looked at both direct and indirect peer influences *simultaneously* in the purchases of Caller Ring Back Tones by users in a large social network. Interestingly, while direct peer influence always has a positive effect on product diffusion, indirect peer influence has a negative effect on product diffusion when the group size is about 200, and a positive effect when group size is about 500. This information obtained on peer influence can be applied to many instances of product diffusion on social media, content creation on social media platforms, and software adoption in social networks. Social media, specifically, allow users to observe the apps used by their direct influences and read about the apps used by their indirect influences (via their direct neighbors). In an effort to diffuse products effectively and efficiently, knowledge of direct and indirect peer influences is valuable for companies.

Real Options Models for Proactive Uncertainty-Reducing Mitigations and Applications in Cybersecurity Investment Decision Making (p. 315)

Michel Benaroch

Managerial flexibility embedded in information technology (IT) investments allow resolving uncertainty not only by passively waiting for new information

to arrive during deferral but also by proactively deploying uncertainty-reducing *mitigations*. Classic real options models cannot account for the value of flexibility to deploy uncertainty-reducing mitigations. We present adaptations of these models in which: zero or more optional mitigations are applied in varying sequences, the uncertainty-reduction effect of a mitigation is conditional on the amount of uncertainty resolved by earlier mitigations, and mitigations can have complementary, substitutive or synergetic effects. We operationalize the adapted models in the cybersecurity investment context and apply them to a real-world case from a Japanese company. Our models recognize that incremental investments in cybersecurity mitigations (solutions) typically have diminishing (or no) benefits beyond a certain point, unlike existing models that treat such investments as independent with a multiplicative effect on loss-prevention. We shows that our models can lower cybersecurity investment costs without compromising on loss-prevention potential. In summary, our models should help practitioners to connect better with the intuition of real options models, and thus enable them to implement the real options logic more fully in support of both passive and proactive IT investment risk management.

Reducing Medicare Spending Through Electronic Health Information Exchange: The Role of Incentives and Exchange Maturity (p. 341)

Idris Adjerid, Julia Adler-Milstein, Corey Angst

Healthcare reform is obviously a topic of great importance today. Many believe a key component of reform is providing clinicians the ability to exchange patient health information with other providers, which should increase the quality and efficiency of care. To enable this exchange of data, governance and technology entities known as health information exchanges (HIEs) have emerged in the U.S. But, are HIEs delivering on the promise to reduce costs? The authors use a national, longitudinal dataset to evaluate whether HIEs reduce spending for Medicare patients, and whether provider incentives to reduce unnecessary care and HIE maturity impact these reductions. Results show significant spending reductions in healthcare markets that have operational HIEs, with an average reduction of \$139 per Medicare beneficiary per year (1.4% decrease) or a \$3.12 billion annual reduction in spending if HIEs were nationally implemented in 2015. These reductions occur disproportionately in healthcare markets where providers have financial incentives to use an HIE and when HIEs are more mature.

The insight for management: HIEs do produce value in the form of decreased costs and these benefits are

more profound in regions where financial incentives are in place and the HIEs have been used longer.

Social Media Strategies in Product-Harm Crises (p. 362)

Shu He, Huaxia Rui, Andrew B. Whinston

Social media nowadays provides a flexible medium through which firms can both induce customer purchases and improve customer relationships, two aspects known as offensive and defensive marketing, respectively. How should a firm adjust its social marketing strategy in this new age when there is a product harm crisis in its industry? To answer this question, the authors theoretically analyze and empirically investigate the social media strategies of the non-focal firms using a unique data set including 56 major airlines' daily social media activities on Twitter around the time of the Germanwings Flight 9525 crash. They find that, on average, non-focal airlines increased their defensive marketing efforts but decreased their offensive marketing efforts after the crash, which can be attributed to the negative spillover effect. However, the strategic adjustment of decreasing offensive marketing is attenuated by the competition between a non-focal airline and the focal one, which can be attributed to the competitive effect. Their study provides direct guidance to the social media strategies of firms in those industries where product-harm crises can occur.

Salience Bias in Crowdsourcing Contests (p. 401)

Ho Cheung Brian Lee, Sulin Ba, Xinxin Li, Jan Stallaert

Crowdsourcing relies on online platforms to connect a community of users to perform specific tasks. However, without appropriate control, the behavior of the online community might not align with the platform's designed objective, which can lead to an inferior platform performance. This paper investigates "salience bias" on a crowdsourcing platform which may lead crowdsourcing contestants to focus more on the information that is explicitly presented on the platform and ignore other important information that may help them achieve desired outcomes. This implies that investing in an innovation that is subject to systematic bias in crowdsourcing contests may result in wasted resources. One plausible remedy for the platform designers and contest holders is to provide training to the contestants to raise their awareness of such behavioral anomalies. Reminding the contestants about the potential cognitive biases through proper contest design can also help to reduce their influence. Furthermore, our research shows that the number of participating contestants may amplify the impact of salience bias on the crowdsourcing outcome when the effort required to complete the tasks is high. Hence,

whether and how to present information about the number of contestants in any given contest is a design issue that platform owners should investigate to reduce the possibility of systematic bias on their platform.

Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt (p. 419)

Knut H. Rolland, Lars Mathiassen, Arun Rai

Digital platforms such as Google's Android, Apple's iOS, and Facebook are becoming increasingly important technologies providing new business models and ways of communicating, socializing, and working. Currently, much research on digital platforms has focused on the platform owner and complementary services and products. In this paper, we have taken a different perspective emphasizing how organizations implement and use digital platforms over time. We explain how existing digital infrastructures as well as platform ecosystems both enable and hinder continuous development and use of a digital platform in an organization. Although extant literature offers important insights into platform management from a platform-owner perspective, we know little about how organizations manage industry platforms provided by external parties to generate opportunities and overcome challenges in relation to their infrastructure and work processes. As part of larger ecosystems, these digital platforms offer organizations bundles of digital options that they can selectively invest in over time. At the same time, organizations' previous investments in digital infrastructure and work processes produce a legacy of digital debt that conditions how they manage their digital platforms over time. Against this backdrop, we investigate how digital options and digital debt were implicated in a large Scandinavian media organization's management of a news production platform over nearly 17 years. Drawing on extant literature and the findings from this case, we theorize the progression of and interactions between digital options and digital debt during an organization's digital platform management in relation to its infrastructure and work processes. The theory reveals the complex choices that organizations face in such efforts: While they may have to resolve digital debt to make a platform's digital options actionable, hesitancy to plant digital debt may equally well prevent them from realizing otherwise attractive digital options. Similarly, while identified digital options may offer organizations new opportunities to resolve digital debt, eagerness to realize digital options may just as easily lead to unwise planting of digital debt.

Does Platform Owner's Entry Crowd Out Innovation? Evidence from Google Photos (p. 444)

Jens Foerderer, Thomas Kude, Sunil Mithas, Armin Heinzl

Platform strategies and the governance of software platforms are a central concern for many firms in today's digital economy. When firms follow a platform strategy, the focus of value-creating activities shifts from internal production toward governing an innovation ecosystem of thousands of app developers or complementors. However, platform owners also have incentives to enter the innovation ecosystem by offering their own complements to improve customer experience through integration, and appropriate higher profits from increased consumer demand or better customer experience. An interesting question in this context is whether such entries promote or hurt complementors' innovation in the ecosystem. Our study of a quasi-experiment in Google's Android ecosystem suggests that Google's entry in the market for photography apps led to an overall increase in complementary innovation. We find that the increase in innovation was related to a surge in consumer attention and demand for photography apps caused by Google's market entry. This attention spillover was more pronounced for larger and diversified complementors that were in a position to leverage the increase in consumer attention and demand. In other words, entry does not always hurt innovation, at least in the short term, and platform owners can stimulate innovation by entering the innovation ecosystem with own products. These findings should help platform owners to understand the likely impact of their actions on innovation. They are also informative for policy-makers grappling with questions related to antitrust policy for regulating dominant digital platforms, and the likely impact on consumer welfare.

Platform Architecture and Quality Trade-offs of Multihoming Complements (p. 461)

Carmelo Cennamo, Hakan Ozalp, Tobias Kretschmer

Multihoming—the decision to design a complement to operate on multiple platforms—is becoming increasingly common in many platform markets. Most complement providers think of multihoming as expanding their market to another platform at a small cost of porting, i.e., modifying their complement to another platform. However, it may be more difficult to port complements to some platforms than to others because platforms have different technological specifications and degrees of complexity. In a study of the U.S. video game industry, we indeed find that multihoming games have lower quality performance on a technologically more complex console than on a less complex one.

Also, games designed for and released on one platform and ported to another one later have lower quality performance on the second platform. Our results suggest that managers have to take the technological costs of multihoming into account and that this cost can differ by the technological complexity of the platform.

Exploiting and Defending Open Digital Platforms with Boundary Resources: Android's Five Platform Forks (p. 479)

Kimmo Karhu, Robin Gustafsson, Kalle Lyytinen

Digital platforms are opened for third-party innovation to generate fast growth through network effects. However, openness that is too wide renders the platform's resources vulnerable to strategic exploitation. The authors identify and analyze a prominent form of strategic exploitation called platform forking in which a hostile firm—a forker—bypasses the host's control points and exploits both the platform's core and complements to create a competing platform business. The authors investigate platform forking on Google's Android platform—a successful open digital platform—by analyzing the fate of five Android forks and related exploitative activities. They also scrutinize Google's responses to curb exploitation and retain control. Research exposes platform forking as a competitive opportunistic platform strategy that avoids heavy upfront investments and solves the hard chicken-and-egg problem in platform ignition. It also reveals how digital strategizing can be used to defend against platform forking.

The insight for management: Competitive advantage is not only gained through leveraging network effects but also through opportunistically exploiting other platforms, and if under exploitation itself, competitive advantage can be sustained by actively using digital means to defend against exploitation.

Strategic Intellectual Property Sharing: Competition on an Open Technology Platform Under Network Effects (p. 498)

Marius F. Niculescu, D. J. Wu, Lizhen Xu

We explore the strategic decision of an incumbent to open a proprietary technology platform to allow same-side co-opetition in a market characterized by network effects. We propose a game-theoretic model that analytically conceptualizes the interplay among the degree of same-side platform openness, the absorptive capacity of the entrant, and the intensity of network effects. Our analysis uncovers interesting new results. First, when entrant product quality is exogenous, under very strong network effects, the incumbent closes the technology. Moreover, we discuss various interesting open-platform co-opetition outcomes that arise under a fully covered market. When the entrant chooses the quality level and the incumbent is strategic in its platform opening decision, we find that intense network effects make new players shun the market, so intellectual property (IP) sharing is not possible in equilibrium. When the network effects are of intermediate intensity, the incumbent opens the technology to the entrants who possess a sufficiently high absorptive capacity, calibrating the amount of sharing to the entrant's absorptive capacity level to ensure that the duopoly setting is mutually beneficial. Our key findings and insights are robust to several model extensions.

The insight for management: We offer actionable and strategic guidance for an incumbent platform to open its IP (core technology) to other potential competitors on the same side of the market, by considering the entrant's absorptive capacity, the intensity of the network effects, and the platform's ability to engineer the strength of network effects. For example, it is often-times preferable for the platform to adjust network effects in parallel with its openness decision.