

COCREATING IT VALUE: NEW CAPABILITIES AND METRICS FOR MULTIFIRM ENVIRONMENTS

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Most research on IT value has been from the vantage point of a single firm. Multifirm studies have largely been dyadic and emphasize transaction costs over cocreation of value. Contemporary environments involve IT investments being made by multiple companies in cooperative, platform-based, and relational arrangements where the objective is to cocreate value. If IT serves as a tool, an output, or is instrumental in generating this cocreated value, then it falls within the cocreation domain of this special issue. In this introductory article, we frame the discussion of cocreating IT value through four layers of relational arrangement between firms, describe the papers in the special issue with respect to this framework, and briefly describe an agenda for research in this important area.

Keywords: Information technology value, cocreation of value, multifirm environments, IT-based relationship value, IT-based platforms

Overview

After more than two decades of business value of information technology research, organizations continue to seek ways to create greater value from IT investments. However, over the past decade, particularly with internetworking technologies, there is a fundamental transformation taking place in the creation of business value. Now, *multiple organizations* collectively leverage IT, thus raising important new issues that cannot easily be addressed by frameworks proposed in current IT value research.

Most research on IT value has examined relationships between IT investments and organizational outcomes. More recently, the value thesis has expanded to examine complementary resources, capabilities, and other mediating factors in value creation. However, given the centrality of the IT value question to our field, it is important to expand the agenda to include how best to *cocreate value* from IT in multi-

organizational forms (Dhar and Sundararajan 2007). These forms raise new issues of value creation, risk allocation, complementary investments, capability building, adoption, absorption, and incentives among collaborating organizations. This special issue focuses on understanding how IT value emanates in multifirm environments.

Contemporary Research Themes

The strategic information systems that garnered attention in the 1980s focused on how a single company could gain a monopolistic position through IT with respect to its customer (e.g., by imposing high switching costs). These positions were often framed by researchers through Porter's (1980) industry structure view. Contemporary environments with open systems and hypercompetition make it difficult to attain such a position and even more difficult to sustain it (D'Aveni

1999). Increasing specialization and demands for shorter concept-to-market time frames make it difficult for a single firm to excel at building the infrastructure for new products and services and to quickly bring them to market. Therefore, firms are increasingly looking to other firms with whom they can collaborate and cocreate IT-enabled products and services (Barrett et al. 2011).

Recent research in the business value of IT has raised several questions that must be addressed. Kohli and Grover (2008) articulate the cocreation of IT value as a critical theme for future research. They propose that we need to understand how IT-based value is cocreated and shared among multiple partners in multi-organizational relationships (Saraf et al. 2007). By emphasizing how joint value is created, IT/IS value research can evolve from the largely singular firm perspective and begin examining how *different* companies with perhaps *different* IT can *join together* and create *new value* that either organization is unlikely to create on its own.

Another way to describe the key question is, *how can multiple firms add new IT-based value and collectively appropriate it?* For instance, from a resource-based theoretical perspective, firms can jointly combine or exchange assets, resources, and knowledge, and create inimitable capabilities to expand their supplementary resources or create new sources of value (Barney 1996). The IT resource in the mix could be in the form of a functionality or embedded knowledge that is brought to the relationship or a digital platform that offers value through greater access to resources and expands functionality.

Framing the Cocreation of IT Value

The relational view (Dyer 2000; Dyer and Singh 1998) proposes that a firm's resources may span firm boundaries and may lie in its relationship with other firms. This view outlines four components that determine relational value: *relationship-specific assets*, *knowledge-sharing routines*, *complementary resources and capabilities*, and *effective governance*. In our context, each of the four determinants of value present a value creation layer and is enabled, expanded, or created by IT. For instance, the assets layer involves relationship specific IT skills or assets that enhance the relationship of the partnering firms; either firm on its own is unlikely to extract similar value. The knowledge sharing layer can be facilitated by common platforms, electronic knowledge repositories, and analytic software to enable new relational arrangements that lead to the creation of new products and services. The complementary capabilities layer encompasses unique IT skill sets shared by the partner firms to construct new sources of value.

Finally, the governance layer provides effective management of the relationship through IT assets such as electronic brokerage and integration. It can facilitate control and execution in the other three layers. Figure 1 illustrates the four IT-based value appropriation layers through which firms can create value. Below, we describe and illustrate the four layers.

The *assets layer* involves two or more firms, at least one of which contributes specialized IT hardware and/or software or network facilities that create new value in the form of digital or physical products and services. This value could *only* be created in conjunction with partners' resources such as manufacturing technology and other physical assets rather than in isolation. Dyer and Singh (1998) propose that relationship-specific assets create value when they are safeguarded to limit opportunism and are utilized in high volume exchanges. These safeguards could be contractual or through long-term relational agreements based on trust. IT enables these safeguards by providing greater transparency of asset usage as well as lower transaction costs among partners. Further, through transparent and frequent use of assets, IT enhances the relationship among partners that can lead to cocreation of products and services. For example, Apple, Inc. has invested in a relation-specific platform asset, iTunes, for its content creating partners (application developers and music labels). Apple cocreates IT-enabled value through its online asset "App Store" by providing transparency on the number of downloads, rating scheme, and customer comments. The content creator partners enhance the value of Apple's App Store asset by populating it with applications for just about every customer need. In another example of cocreation of value through use of physical assets, United Parcel Service (UPS) offered its transportation assets to brokers who deal with small packages. Also known as "less than truck load" (LTL) brokers, these UPS partners provide physical facilities to gather packages for UPS trucks that otherwise would go half empty. UPS assets in the relationship include IT-based systems for use by brokers that facilitate transactions through automated scanning, accounting, estimated delivery date, and pricing. This relationship has enabled cocreation of value emerging from the retail package business by assimilating relationship-specific assets of a large shipping company with those of LTL brokers. Without asset sharing, neither partner by itself could provide efficient transactions for the numerous dispersed locations of the small package delivery business.

The *complementary capability layer* focuses on identifying and exploiting complementary resources/capabilities among the partners such that together they are a source of value that a partner could not build on its own. Typically this would involve an IT-based resource or skill provided by one company that leverages partners' resources. In order to identify and leverage such opportunities, a firm that has experience

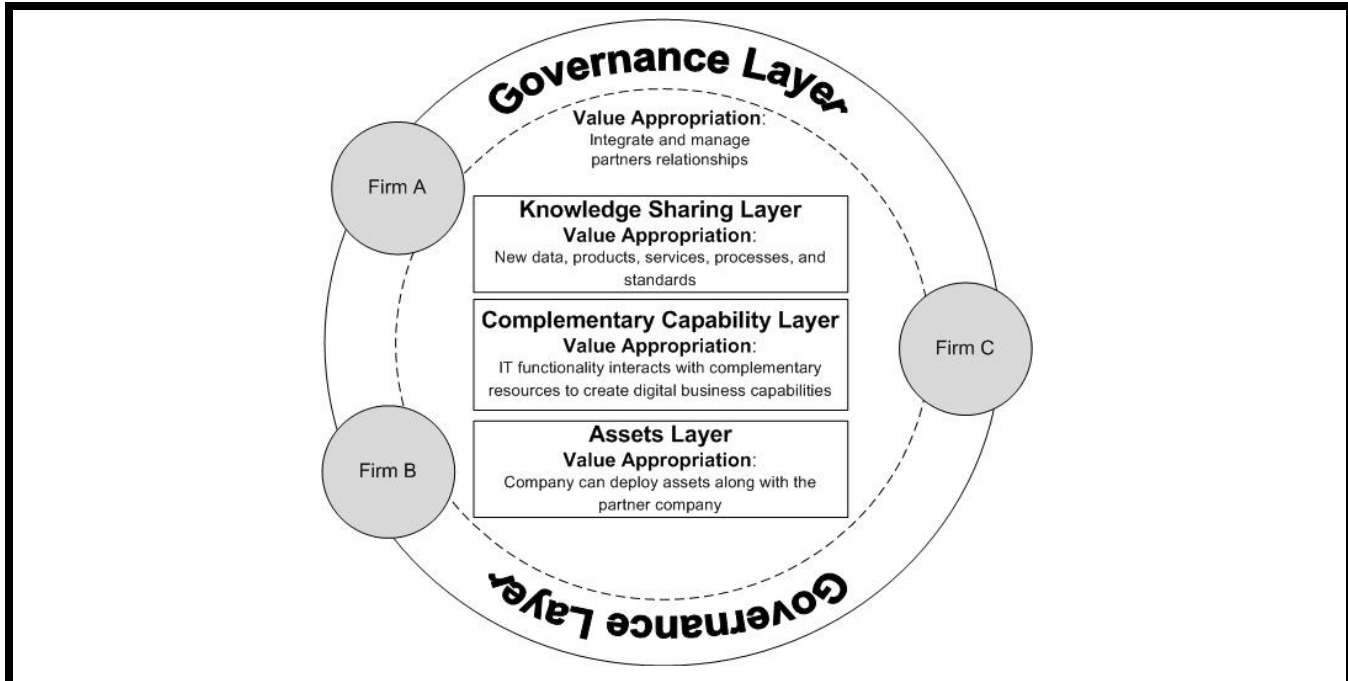


Figure 1. Cocreating IT Value

with such alliances as well as a strong understanding of the partner network and its resources and capabilities is in a superior position to cocreate value. For instance, an automaker that assembled various models of cars and trucks required tire suppliers to deliver appropriate quantities and sizes of tires at various assembly line locations. It sought a tire manufacturing partner with a complementary capability to electronically integrate the automaker's manufacturing plan with its tire manufacturing and distribution system in order to meet the delivery requirements. The tire manufacturer was facing stiff competition from cheaper imported tires but possessed an inimitable capability of a flexible supply chain that its foreign competitors could not match. The automaker and tire manufacturer had the technical ability to recognize the complementarity of each other's capabilities. They collectively cocreated value from "sequencing" whereby tires were delivered at the auto assembly lines to match the sequence of vehicles coming off of the assembly lines. This IT-enabled process also streamlined distribution for the tire manufacturer and lowered inventory carrying costs for the automaker.

Similarly, as suppliers to the same grocery store customers, General Mills and Land O'Lakes cocreated a business process by sharing their complementary capabilities of order-taking and delivery logistics that would lower costs for both partners and also improve customer service to grocery stores (Hammer

2001). Land O'Lakes and General Mills also partnered with Nistevo (now IBM Sterling Transportation Management System), an online collaborative logistics company, with partner capabilities to search for product demand, destination, and route–freight configurations that would enable trucking companies, grocery stores, and manufacturers to draw synergies from complementary capabilities among partners. The IT served as a tool to identify and leverage complementary capabilities in cocreating value for all partner firms.

The *knowledge sharing layer* involves the sharing of information and expertise that can inform decision-making and strategies for cocreating new or better products (Dyer and Hatch 2006). Clearly, a good IT infrastructure and processes for sharing knowledge can enhance absorptive capacity—or the ability to recognize, assimilate, and exploit external (partner) information (Cohen and Levinthal 1990). Additionally, the right incentives must be in place for firms to share their proprietary knowledge for a collective good. All partners must perceive mutual value from knowledge sharing and use. The capacity of an information technology to capture, store, and analyze information and to disseminate knowledge offers many opportunities for cocreation of business value. Further, the absorptive capacity of the firm can be made scalable with IT such that it offers greater opportunities for knowledge availability, sharing, and assimilation.

Table 1. Cocreation of IT-Based Value

	IT Investments	Enablers	Value Cocreation
Asset Layer	Idiosyncratic investments in interorganizational IT (software and hardware)	<ul style="list-style-type: none"> • Incentives • General IT and organizational infrastructure 	Digital and IT-supported products and services (e.g., Apple, Inc. and United Parcel Service)
Complementary Capability Layer	IT functionality (e.g., software, skills) or capability (e.g., real-time product availability that synergistically complements partner resources)	<ul style="list-style-type: none"> • Experience • Partner information • General IT and organizational infrastructure 	IT-enabled capabilities (e.g., tire distribution and auto assembly; General Mills, Land O'Lakes, and Nistevo logistics)
Knowledge Sharing Layer	Sharing of knowledge repositories and use of analytical software	<ul style="list-style-type: none"> • Absorptive capacity • Incentives • General IT and organizational infrastructure 	IT-enabled decisions and strategies (e.g., Motorola's CPFR)
Governance Layer	Interorganizational systems that facilitate brokerage and integration effects	<ul style="list-style-type: none"> • Informal contracts (trust) • Alignment of transactions with governance • General IT and organizational infrastructure 	IT-enabled cost reduction (e.g., Amazon.com, chemicalonline.com, Global Health Exchange)

Motorola, a mobile phone manufacturer, shared its analytical and technological knowledge with a large mobile phone retailer to better forecast demand and replenish supplies of mobile phone devices. In return, the retailer provided retail sales data and information about customer preferences. Together, the partners cocreated forecasting capability through an IT-based collaborative planning, forecasting, and replenishment (CPFR) process that would reduce inventory and product redundancy costs for the manufacturer and provide product availability for the retailer (Cederlund et al. 2007). Further, learning from knowledge sharing through CPFR led Motorola to offer vendor managed inventory (VMI) in which the vendor (Motorola) would own the inventory in the retailer's stores and also be responsible for ensuring product availability. The incentive for the retailer to share its sales data and product knowledge was an assurance that the retail shelves would be well stocked. Similarly, by sharing its analytical and CPFR knowledge, Motorola learned from the retailer about cyclical fluctuations in demand and changes in customer preferences that would inform its inventory planning and design of future mobile phone models, respectively.

The *governance layer* focuses on setting up a control structure that reduces transaction costs and incentivizes new value cocreation. This is typically done through contracts and formal economic safeguards. However, social and informal controls can also play a major role and are arguably less costly in facilitating cocreation of value. The governance layer can be viewed as the layer that integrates the assets,

complementary capabilities, and knowledge exchange layers. The governance layer assumes even greater significance when cocreation involves several firms in a loosely coupled cooperative arrangement with the intention to cocreate products and services when conditions are conducive (Dhanaraj and Parkhe 2006). Lower transaction costs in the cocreating process can create competitive value through relational cost focus that is difficult to imitate by competitors (Porter 1980).

IT can facilitate information integration and brokerage to lower transaction costs when appropriately matched with partner transactions. Joint investments in IT can also incentivize parties to work together in order to leverage their investments or avail of externality benefits. For instance, Amazon.com provides a governance layer for hundreds of small and specialty retailers to cocreate value for its partners by providing an affordable online interface for searching, ordering, and payments of products as well as a mechanism for conflict resolution. Governance layer cocreates value for Amazon.com because it provides customers with a one-stop shopping site with a large selection of specialty products that Amazon.com cannot possibly stock and a source of revenue that funds expansion of its governance layer to greater numbers of products and partners. Other examples of firms that cocreate value by lowering transaction costs are electronic exchanges chemicalonline.com and Global Health Exchange, and travel brokers such as Travelocity.com and Expedia.com.

Integrative View of Cocreation Layers ■

It is useful to note that while these sources of IT-based value cocreation are discussed separately, they do reflect interdependencies as well as path dependencies. Regarding interdependencies, the creation of one type of value can stimulate cocreation of another type of value. For instance, having an effective governance capability can incentivize learning and knowledge sharing, leading to greater investments in specialized assets, and cocreation of new capabilities. Similarly, investments in knowledge sharing can stimulate opportunities for asset and capability enhancement, leading to the cocreation of new digital products and capabilities. Sharing of IT-based developmental skills or leveraging a common IT-based platform can spawn ideas for new innovations. Regarding path dependencies, cocreated value in one layer can create the option for further value. For instance, once capabilities are in place, they could be enhanced with IT functionality to cocreate higher quality capabilities. In each of the illustrations discussed earlier, the IT-enabled cocreated products, services, or capabilities create conditions and opportunities that may not have been fully foreseen before the initial cocreation. This could create a virtuous circle of value enhancement.

Contemporary IT environments are platform-based, and there is evolving research on competition among various platforms. Cocreation is greatly enabled by platforms that provide infrastructure for new value creation and distribution. In terms of the typology above, these platforms often create fertile ground for sharing of assets, development of digital capabilities, sharing of knowledge and facilitating governance.

Cocreation of IT-Based Value: Mapping Papers in the Special Issue ■

The four papers in this special issue reflect a different aspect of IT value cocreation as well as a variety of different methodologies for assessing such value. We map each paper onto our framework as summarized in Table 2.

Rai, Pavlou, Im, and Du examine IT-based value cocreation between a large logistics supplier and over 2,000 buyers. They identify a set of IT functionalities (single-location shipping, multilocation shipping, supply chain visibility, and financial settlement) that, when implemented and used to execute logistics processes, complement resources (physical goods, information, finances) and cocreate value by building IT-based capabilities. While the primary focus is the *complementary capability layer*, they also demonstrate the role of

interfirm communication in enhancing relational value, thereby working at the *knowledge sharing layer*. Further, the paper describes and examines how advanced IT functionalities when used together can create more sophisticated interfirm IT capabilities. This suggests a *positive IT-based cocreation cycle*, with greater IT embeddedness spawning cocreated value, which in turn can form the basis for further value enhancement. The study draws from secondary data, and uses share of wallet and loyalty as the measures of relational value.

Ceccagnoli, Forman, Huang, and Wu focus on the joint value creation between platform owners and firms that complement the platform. They examine whether participation in an ecosystem partnership improves the business performance of small independent software vendors (ISVs) in the enterprise software industry and how appropriability mechanisms influence the benefits of partnership. Here, each partnership involves integration of IT assets in order to create joint value, thereby focusing on the *asset layer*. The platform owner gains externality effects from having more ISVs, while the ISVs gain possible credibility and access to a distribution channel. The paper also deals with adverse affects of the *knowledge sharing layer* on the ISV, as joining a platform might lead to spillover effects of knowledge. The study examines if these spillover effects are mitigated in cases where the ISV has its own downstream capabilities (i.e., unique knowledge) and patent protection. Using secondary longitudinal data from 1,210 small ISVs and their decision to join the SAP platform, the study tests the effects of the decision to cocreate value for the ISV measured through increase in sales and likelihood of attaining an IPO. Of course, on common platforms, strong participation of developers will enhance the innovative solutions provided to customers, creating a virtuous cycle of indirect network effects leading to a positive IT-based cocreation cycle.

Han, Oh, Im, Chang, Oh, and Pinsonneault examine open innovation alliances (OIA) involved in the codevelopment of new IT. These alliances aim to cocreate IT-based value. They lower transaction costs by offering a governance structure (*governance layer*) that facilitates openness, self regulation and self monitoring, thereby limiting opportunistic behavior. Most importantly, the authors focus on the *knowledge sharing layer* as the OIA facilitates knowledge exploration and exploitation. The authors investigate the market reaction (wealth creation effects) to announcements of OIA participation on the firm participating as well as rival firms operating in the same marketplace. Several contextual factors, including the degree of partner heterogeneity, innovation type, and the degree of openness of the OIAs, are used to account for variability in abnormal returns. The results pro-

Table 2. Cocreation Value Elements Mapped by Each Paper

	Interfirm IT Capability Profiles and Communications for Cocreating Relational Value: Evidence from the Logistics Industry (Rai, Pavlou, Im, and Du)	Cocreation of Value in a Platform Ecosystem: The Case of Enterprise Software (Ceccagnoli, Forman, Huang, and Wu)	Value Cocreation and Wealth Spillover in Open Innovation Alliances (Han, Oh, Im, Chang, Oh, and Pinsonneault)	Exploring Value Creation in Relationships Between an ERP Vendor and its Partners: A Revelatory Case Study (Sarker, Sarker, Sahaym, and Bjørn-Andersen)
LAYERS				
Asset Layer		X		
Complementary Capability Layer	X		X	X
Knowledge Sharing Layer	X	X	X	
Governance Layer			X	
INTEGRATION				
Positive IT-Based Cocreation Cycle	X	X		
IT-Based Cocreation Dependencies				X
Cocreation Platform		X		X

provide interesting insights into the dynamics of cocreating value through cooperation versus competition by studying both knowledge sharing and wealth spillover. The paper also touches on the *complementary capability layer* by examining partner diversity and the degree of openness needed to pool complementary resources without incurring high costs of coordination.

Sarker, Sarker, Sahaym, and Bjørn-Andersen used a revelatory case study to explore value cocreation between an ERP vendor and its partners that adds value to the ERP through customization and add-on software modules for firms who adopt ERPs. The partner firms cocreate value through the *complementary capability layer* by sharing capabilities and resources to enhance the value derived from the ERP system for end customers. The study reveals the mechanisms underlying cocreation of value that include *knowledge sharing* through addition and synergy integration. “Addition” occurs when a partner adds implementation and training expertise to implement an ERP for a customer. The authors provide insights into the “integration” where the ERP serves as a *cocreation platform* that reinforces trust, surrendering some autonomy, and fosters investments in the relationship. By sharing technical knowledge about system design and functions, the ERP vendor cocreates greater value for its partners who then develop add-on software modules, customize the ERP, and train end customers. Learning that emerges from use of add-on modules, training, and customiza-

tion presumably creates a sensing complementary capability that informs the ERP vendor about enhancement and improvements required in future versions.

Forward Looking Agenda

The four papers in this special issue tap into many elements of IT-enabled value creation. In some form, the authors in this section touch on all four layers of IT-enabled cocreation. Rai et al. focus primarily on the cocreated value as one firm brings its sophisticated functionality to leverage complementary resources of the other. This illustrates cocreation of value through construction of new IT-enabled capabilities in an information intensive industry. Ceccagnoli et al. examine a common dilemma in whether joining a platform and cocreating value is worthwhile given the possible risk of intellectual property loss. In contemporary environments where platform-based competition is proliferating, insight into the considerations that lead to such decisions is critical. Han et al. deal with another growing phenomena of IT-based cocreation through open innovation. This governance mode can facilitate expansion of the pie for all participants through new cocreated value (i.e., products), but it is important to understand factors that might mitigate value for individual participants as well as issues of free-riding on joint value created by nonparticipants. Sarkar et al., through their case, tie the layers together by demonstrating that the relationship

forms a virtuous cycle of cocreation dependency in which the need for new or improved features gathered by partners enables the ERP vendor to continuously improve its product.

We believe that cocreation represents one of the most important streams in the IT value research area that will gain greater importance as firms expand collaborative relationships with other firms. There are opportunities and challenges along the way that offer fertile themes for IS researchers. Below we offer a brief sampling of such opportunities for expanding research in IT-based cocreation of value.

1. *To focus more on interdependencies between the layers of IT-based value cocreation.* We view the interdependencies among the four layers (Figure 1) as potentially significant to yield greater sources of value. For example, future research may examine if there are temporal or sequential dependencies among the four layers. Past research, as well as the papers in this special issue, touched on the path dependencies between layers, but have not explicitly examined how realizing cocreated value can create new options for further expanding value. Such positive value cycles are likely to be important in digital businesses where the asset layer (e.g., eBay's data repository) can be quickly deployed with the richness of the knowledge sharing layer (e.g., patterns search algorithms in IBM's Watson) to enhance capabilities to identify favorable conditions to maximize sales of certain products. It may be fruitful to understand the source of these interdependencies and how they might vary between the ability of digital and physical firms to cocreate value.
2. *To focus on the "process" of IT-based cocreation.* While conceptually the idea of cocreation is intuitive and simple, the process through which firms can successfully implement it is likely to pose several challenges. How do firms select partners? How do relationships evolve? How do they conclude? The importance of "process" is heightened for knowledge-sharing where the inputs to cocreate are rather intangible while the realization of cocreated value is tangible. We expect future research to address questions such as, are there stages that need to be followed that articulate the necessary conditions that must be in place before moving to the next stage?
3. *To expand the sources of IT-based cocreated value.* Our framing drew largely from the relational perspective with the assumption that firms will form a cooperative bond and be willing and able to cocreate value through thoughtful use of IT. However, there are several other aspects that need to be emphasized in order to set a comprehensive research agenda. For instance, what are the incentives to cocreate, particularly when firms are already successful in their traditional business? What are the criteria for equitable distribution of "value" among cocreators given the need to protect intellectual property (Pisano 2006)? Does knowledge sharing carry the same weight in cocreation as sharing of physical assets? What organizational governance should be in place? How will the firms establish proprietariness for assets that emerge from cocreation within extant regulatory regimes (e.g., anti-trust)? How will they share the risk or losses from interfirm arrangements (Gebauer and Buxmann 2000)? Also, the layers (discussed above) presume an "inside-out" view of value cocreation as the value comes from the relationship. How would this value be influenced by the structure of the competitive marketplace or the "outside-in" view?
4. *To examine IT platform-based competition and IT-based value cocreation.* Much of the competition of digital products and services now is at the platform level with various cooperative arrangements engaging in a higher level of competition, often globally (Prahalad and Krishnan 2008). It is likely that platforms, which are a source of value, will become "open" or will be replaced with other open platforms such as RosettaNet. How do firms make choices regarding whether their platform should remain closed or open? What aspects of the platform might be selectively closed or open? How will firms that currently extract value from the platform migrate to another layer of cocreation? Should the process of IT value cocreation (discussed above) account for such changes? Cocreation among firms is likely to encounter partners who are also competitors. How can firms compete and cooperate in an environment of coope-tition and still appropriate equitable value (Hurmelinna-Laukkanen and Ritala 2010)?
5. *To examine how disparate IT functionality can be brought together to create new IT-based value.* Just like faster processing workstations, sophisticated software, and high-quality printers cocreated new IT-based value in desktop publishing, graphics design, music remixing, and movie editing, we believe that far greater combinations of technology (hardware, software) and wireless telecommunications (e.g., mobile phones) to cocreate value are on the horizon. For example, home diagnostics devices manufacturer, Telcare, and mobile phone application developers have cocreated new value through an application that allows diabetic patients to wirelessly transmit their blood glucose reading to a database that can then be accessed by patients or physicians via

iPhones. The application tracks and charts patient history and flags higher glucose levels (Mossberg 2012). Similarly, 3D printers are likely to afford opportunities for various component makers to deliver physical products through the digital channel, something that is first of its kind, and thus cocreates new avenues for new value. Research on identifying fundamental units of IT innovation and how they can be combined in order to cocreate new value is important for us to understand at a basic level the role of the IT artifact.

Conclusion

We have highlighted a contemporary issue of cocreating IT value that is of increasing importance for firms that seek to be agile and innovative. In this paper, we have framed the cocreation of value through IT as emerging from four layers: *relationship-specific assets*, *knowledge-sharing routines*, *complementary resources and capabilities*, and *effective governance*. We described each layer with examples of firms that cocreated value by exploiting IT. As firms continue to collaborate, we see several new areas of cocreation opportunities by taking an integrative view of the four layers such as interdependencies among the IT value creation layers, the process through which cocreation of IT value occurs, IT platform-based value, and new sources of value.

Through this special issue, our goal was to seek exemplary studies of IT-based cocreation of value. Each of the four studies examines IT-enabled value cocreation from different vantage points. As we surmise above, it is apparent that while the papers here deal with important aspects of value creation, there is a vast domain that we believe will become an instrumental part of the IS value research stream as well as the broader IS research agenda. As the dynamics of competition and cooperation among firms continue to evolve, and IT-based infrastructures, devices, and software tools create opportunities for value cocreation, we look forward to a high incidence of theoretical and empirical work in this area.

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