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## Reflecting on the “Dark Side” of Information Technology Use

John D'Arcy

*Lerner College of Business and Economics, University of Delaware*

Ashish Gupta

*College of Business, University of Tennessee Chattanooga*

Monideepa Tarafdar

*Management Science Department, Lancaster University Management School, m.tarafdar@lancaster.ac.uk*

Ofir Turel

*College of Business and Economics, California State University, Fullerton and University of Southern California*

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# Communications of the Association for Information Systems



## Reflecting on the “Dark Side” of Information Technology Use

John D'Arcy

*Lerner College of Business and Economics, University of Delaware*

Ashish Gupta

*College of Business, University of Tennessee Chattanooga*

Monideepa Tarafdar

*Management Science Department, Lancaster University Management School*

*m.tarafdar@lancaster.ac.uk*

Ofir Turel

*College of Business and Economics, California State University, Fullerton and University of Southern California*

### Abstract:

The authors of this article participated in a panel session at the Americas Conference on Information Systems (AMCIS) 2012 with the objective to advance knowledge in areas related to the “dark side” of information technology (IT) use in organizations. We introduced new areas of exploration and disseminated new points of view on the potentially negative impacts of IT use. We drew upon our collective research and practice-related insights in five areas that characterize the dark side of IT use, namely—IT-usage-related stress, work overload, interruptions, addiction, and misuse. These are clearly important areas to examine, given that the ubiquitous and functionally pervasive nature of IT use in organizations is expected to expose users to ever greater levels of conditions that are potent for experiencing this dark side. We discussed the relevance and implications of the topic to the IS research and practice communities.

**Keywords:** dark side, security, technostress, interruptions, information overload addiction, misuse

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### I. INTRODUCTION

Recent studies conducted by professional/industry bodies reveal interesting and often alarming evidence about how IT is being used. For instance, 43 percent of users find the use of smart phones stressful; 60 percent of users cannot go for an hour without checking their phones for messages and email; 30 percent of users check their smart phones at meals, 24 percent while driving, and 54 percent in the middle of the night or immediately upon waking up.<sup>1</sup> According to one study, people spend as much as 28 percent of their workday on IT-related interruptions [Spira and Feintuch, 2005], which may translate into huge monetary and psychological costs, while a separate study reports that it takes approximately twenty minutes to get back to the original task after the interruption [Mark et al., 2005]. More alarmingly, 50–75 percent of all information security breaches stem from misuse by users/employees.<sup>2</sup> Such evidence indicates an emerging dichotomy in IT-enabled patterns of work and collaboration: that of quick and easy information access and flexible work patterns versus addiction, misuse, overuse, and stressful use.

Academic research is beginning to focus on negative impacts of IT use. This is clearly an important area for the IS research community to attend to, given the results from initial studies and considering that the ubiquitous and functionally pervasive nature of IT use in organizations is expected to expose users to ever-greater levels of conditions that are potent for experiencing this “dark side” of IT use. We draw on research and practice-related insights in five important areas that characterize the dark side of IT use, namely—IT-usage-related stress, work overload, interruptions, “addiction,” and misuse. Given the fledgling nature of research and understanding in this area, the article seeks to (1) introduce new areas of exploration, (2) highlight key topics that have been examined, and (3) outline potential areas of future research. This article draws on the work of researchers who have shared their insights in a panel discussion at the AMCIS 2012.

### II. TECHNOSTRESS: STRESS CAUSED BY THE USE OF IT

Technostress is defined as the stress caused by an inability to adapt to or cope with IT in a healthy manner [Tarafdar, Ragu-Nathan, Ragu-Nathan and Tu, 2007, p. 308]. The increasing incidence of technostress is attributable to employees’ growing dependence on technology (computing and communication devices, enterprise applications, collaborative applications, connectivity tools) in almost all aspects of organizational life. Research on technostress reveals four main aspects of this phenomenon—conditions that create technostress, mitigating factors, adverse effects of technostress on work life, and antecedents of technostress.

Technostress creators include techno-overload (i.e., information overload and IT-enabled multitasking), techno-invasion (i.e., never feeling “free” of IT), techno-complexity (i.e., users find it intimidating to learn and use IT), techno-insecurity (i.e., feelings of insecurity in the face of unfamiliar IT) and techno-uncertainty (i.e., feeling unsettled due to continual IT changes) [Tarafdar et al., 2007]. Research has linked these aspects of technostress to adverse organizational outcomes, including decreased job satisfaction, organizational commitment, productivity, and end-user satisfaction, as well as increased role conflict, role/work overload, and work–home conflict [Ayyagari, Grover and Purvis, 2011; Ragu-Nathan, Tarafdar, Tu and Ragu-Nathan, 2008; Tarafdar et al., 2007].

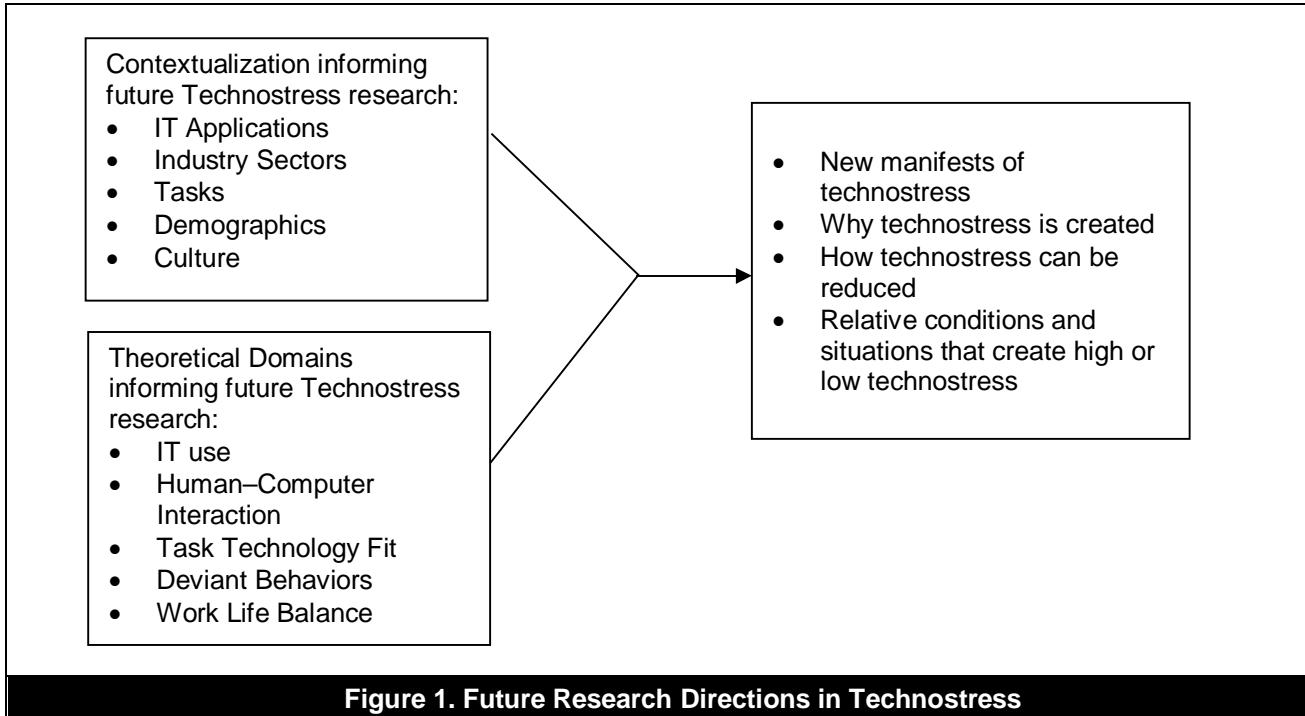
Technostress mitigators include technical and literacy support (i.e., help-desk support, training, and documentation on newly adopted IT systems), involvement facilitation (i.e., keeping users informed and involved in new IT adoptions), and innovation support (i.e., encouraging users to explore and experiment with IT functionality) [Ragu-Nathan et al., 2008; Tarafdar, Tu, Ragu-Nathan and Ragu-Nathan, 2011].

In terms of antecedents, age, gender, and computer experience have each been linked to technostress (i.e., younger users, females, and those with less computer experience exhibit increased technostress). Technical antecedents include various characteristics of modern IT such as usefulness, reliability, presenteeism/ubiquitousness, anonymity, and pace of advancement [Ayyagari et al., 2011]. Ironically, all these qualities are desirable characteristics of IT and can actually enhance its usefulness as well.

<sup>1</sup> Lookout Mobile Security, “Mobile Mindset Study—June 2012,” <https://www.mylookout.com/resources/reports/mobile-mindset>.

<sup>2</sup> *InformationWeek Research Report*—March 2009, “Understanding the Danger Within,” <http://reports.informationweek.com/abstract/21/1250/Security/tech-center-understanding-the-danger-within.html>.

The current state of technostress research offers a broad framework for examining this phenomenon (Figure 1). There are instruments that provide guidance for organizations in measuring technostress and designing appropriate interventions [Tarañdar et al., 2011]. In terms of future research, there is substantial scope for cross-domain theoretical development by assimilating perspectives from areas such as task-technology fit, role overload and role ambiguity, and human-computer interaction. Continued theoretical development should include contextualization to different situations in order to discover greater theoretical nuance and granularity. For instance, examining technostress across different applications (e.g., enterprise systems, social media), tasks (e.g., administrative, knowledge work), functional areas (e.g., accounting, IT security), and cultures (both national and organizational) is a worthwhile endeavor. Longitudinal studies of technostress and continued IT use are also recommended.



**Figure 1. Future Research Directions in Technostress**

### III. INFORMATION OVERLOAD AND MULTITASKING

Much of the collaboration and communication capabilities provided by new IT paradigms (e.g., cloud computing and tools) enable positive outcomes such as interoperability, productivity gains, and access to greater quantities of information at a faster pace. However, increased IT usage leads to problems of information overload and multitasking, and modulates how employees function in the workplace. Information overload, an undesirable condition that occurs when the information to be processed exceeds one's information processing capacity [Speier, Valacich and Vessey, 1999], is one of the strongest predictors of workplace stress and job turnover [Moore, 2000]. Multitasking is another phenomenon that occurs because of the interplay among various IT-related factors such as technology addiction, interruptions, and use of non-interoperable technologies [Gupta, Sharda, Ducheneault, Zhao and Weber, 2006; Li, Gupta, Lou and Warkentin, 2011].

There is a paucity of research on these two phenomena in the IS literature. In particular, research is needed to understand various individual, situational, environmental, and technological characteristics that influence the magnitude and directionality of multitasking and information overload. Future studies could also focus on understanding the various negative consequences of information overload and multitasking on task performance and satisfaction in conjunction with various reward mechanisms and positive outcomes. This research should include both controlled laboratory studies and studies in field settings. An example of the former is an investigation of how the frequency of interruptions and position of the sender interact with an individual's multitasking preferences, and jointly influence the person's satisfaction and subjective task complexity [Li et al., 2011]. Another related study assessed the effect of perceived task complexity on information overload and task performance in an interrupted work environment [Gupta, Li and Sharda, 2013]. Further research also needs to focus on understanding the interactions among various user, task, environmental (context), and IT characteristics that lead to information overload and multitasking situations, and also influence various cognitive and performance outcomes in individuals and group settings. Two additional areas for future research in this domain are described below.

- Developing better interface designs—Poorly designed interfaces obscure key data and disrupt established cognitive processes [Cartright, de Sylva, Glasgow, Rivard and Whiting, 2002]. More research is needed to develop smart interface designs that are capable of effectively presenting the knowledge derived from the processing of large volumes of data originating from multiple repositories to improve usability (efficiency, effectiveness, and satisfaction) and support a user's cognitive processing. This is particularly important for chaotic work environments, such as healthcare, that are typically marred by task complexity, time pressure, information overload, and multitasking. Future research could use guidelines from design science [Hevner, March, Park and Ram, 2004] and concepts from requirements engineering to develop new technologies and/or improve on existing technologies with the objective of mitigating the negative effects of IT.
- Innovative methodological approaches—There is a need for applying new methodological approaches to explore innovative solutions to information overload and multitasking issues. One suggested pathway is leveraging the capabilities of modeling approaches such as (data driven) analytical and simulation-as-alternative lenses for theory development and testing. Data analytics helps with decision making. It could be supplemented with visualization techniques that may reduce the cognitive burden on the decision maker. Simulation methodologies use a combination of inductive and deductive approaches and offer a third way of doing science [Axelrod, 2005]. For example, simulation modeling has been used to study the multidisciplinary rounding process in intensive critical care units where access to data is limited and the care delivery environment is chaotic. To this end, researchers have modeled the care delivery processes associated with multiple healthcare providers to identify strategies for improving rounding efficiency and effectiveness [Gupta et al., 2013; Dong, Chbat, Gupta, Hadzikadic and Gajic, 2012]. Another study reported on a simulator developed to assess the effectiveness of time-based information processing strategies with respect to interruptions and information overload [Gupta and Sharda, 2008]. Gupta and Sharda [2013] provide guidelines for applying various approaches to the healthcare context, and these approaches can be expanded to other business domains.

#### IV. TECHNOLOGY-RELATED “ADDICTIONS”

In some IT-use contexts, users may develop a strong maladaptive psychological dependency on using a technology artifact, which can result in a pattern of excessive IT-seeking and IT-use behaviors that take place at the expense of other important activities, and deteriorates individuals' normal functioning [Turel, Serenko and Bontis, 2011a]. This phenomenon which can be termed “addiction” can form when one uses a system that provides strong hedonic rewards [Turel and Serenko, 2012]. Examples of such systems include online video games [Xu, Turel and Yuan, 2012], mobile email [Turel and Serenko, 2010], social networking websites [Karaïkos, Tzavellas, Balta and Paparrigopoulos, 2010], and online gambling websites [McBride and Derevensky, 2009]. Even though in such IT-use situations the rewards do not come from substances, there is a risk that vulnerable brains develop a strong maladaptive dependency on the rewarding behavior [Ahmed, 2004; Holden, 2001].

More than a decade of studies has demonstrated that technology-related “addictions” are plausibly viable phenomena that merit research [Byun et al., 2009]. After all, such technology-related addictions can negatively influence one's quality of life, the lives of his or her family and friends [Bruner and Bruner, 2006; Fu, Chan, Wong and Yip, 2010; Griffiths, 2000], and possibly his or her work attitudes and behaviors [Turel et al., 2011a]. Moreover, these potential “addictions” can share similar neurological pathways with substance addictions [Han et al., 2011; Han, Hwang and Renshaw, 2010; Ko et al., 2009]. Accordingly, the accumulated body of findings have sparked an as-yet unresolved debate regarding the need for formally recognizing technology-related “addictions” as a special category of disorders [Block, 2008]. Recognizing this need, the latest version of the Diagnostic and Statistical Manual of mental disorders (DSM-V) includes, for example, “Internet Gaming Disorder” as a potential disorder that merits further research.

The IS research community has started exploring some of the correlates, antecedents, and consequences of this relatively new phenomenon (see review in Turel, Serenko and Giles, 2011b; Turel and Serenko 2012). Nevertheless, much more work should and could be done in this domain. The results of such studies could potentially impact the wellbeing of individuals and societies [Block, 2008], as well as indirectly the performance of employees and organizations. Focusing on an input-process-output model, Figure 2 depicts a possible research agenda for studying technology-related “addictions.”

Future studies can focus on the individual, social, organizational, national, and system-related antecedents and outcomes of technology-related “addictions.” They can also focus on refining the definition of such “addictions,” their measurement, the boundary conditions and contexts for these phenomena, as well as on developing technology-“addiction” screeners. Other potential areas of focus include the processes that can translate certain conditions, including brain, social, and psychological issues into addictions, addictions into outcomes, and the effects of the

feedback and reinforcement cues provided by these outcomes. Clinical research may also be applied by focusing on detection, prevention, quitting strategies and their success factors, as well as on harm reduction strategies.

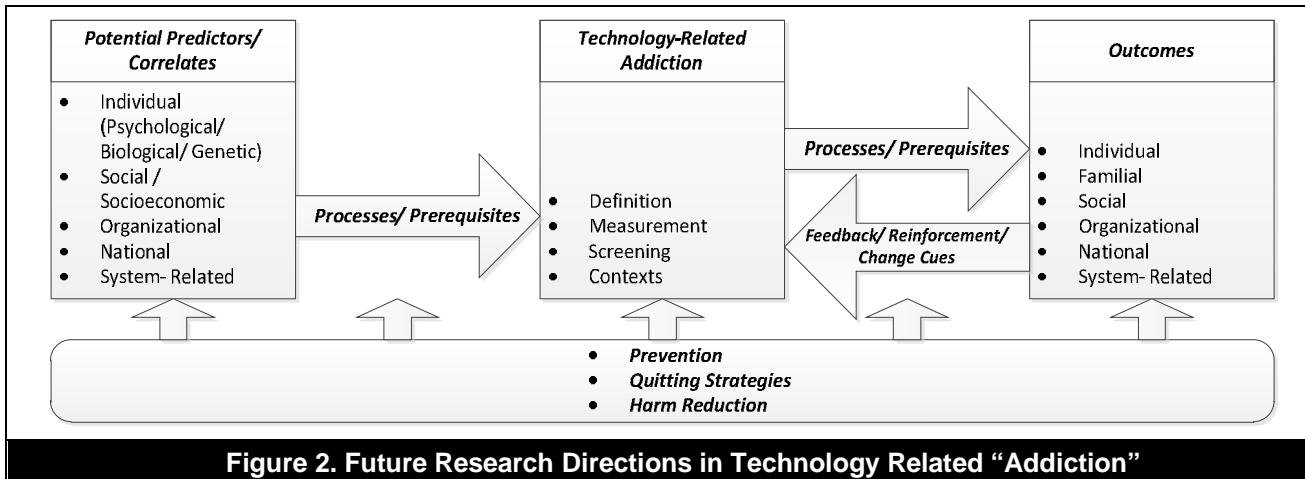


Figure 2. Future Research Directions in Technology Related “Addiction”

## V. INFORMATION TECHNOLOGY MISUSE

An undesirable side effect of firms' increasing reliance on IT is a greater exposure to a diverse set of information security risks. One such risk is intentional employee misuse of IT, defined as “the unauthorized and deliberate misuse of assets of the local organizational information system by individuals” [Straub, 1990, p. 257]. IT misuse has been identified as a top security threat in numerous industry surveys. For example, the Computer Security Institute has consistently cited employee abuse of network access or email as one of the most frequent and expensive types of security breach in their annual computer crime and security survey (e.g., CSI, 2011). Particularly concerning is evidence that links lower-level IT misuse, such as data snooping and email/Internet abuse, to more extreme security incidents, such as sabotage of networks, physical damage to IT systems, and data theft [Verizon Business Systems, 2010].

Due to the number and significance of IT misuse incidents, the topic has garnered increased attention from researchers. Empirical results suggest that the threat of formal sanctions has at least some deterrent influence on IT misuse [D'Arcy and Herath, 2011]. Research also has linked non-punishment factors, such as security-related attitudes and beliefs, role of top management, individual dispositions (e.g., level of self-control, moral predispositions), social influences, coping mechanisms, and education and training to various forms of IT misuse and related behaviors (e.g., Bulgurcu, Cavusoglu and Benbasat, 2010; Hu, Diney, Hart and Cooke, 2012; Warkentin, Johnston and Shropshire, 2011). Table 1 provides a list of these known predictive factors.

Table 1: Predictors of IT Misuse (and Related Behaviors\*)

Attitudes and beliefs (security-related)	Sanctions (formal and informal)
Moral considerations	Security awareness
Neutralization techniques	Self-control
Organizational commitment	Self-efficacy (security-related)
Perceived risks and benefits	Threat and coping appraisal
Perceptions of management	Top management commitment
Personal and workplace norms	Training and education (security-related)
Policy mandatoriness	

\* Related behaviors include security policy compliance/noncompliance; see D'Arcy and Herath [2011] and Warkentin et al. [2011] for summaries of this literature.

Despite the growing research in this area, our understanding of IT misuse remains incomplete. Studies of IT misuse generally explain between 30–50 percent of variance in their behavioral-outcome variable. Practically speaking, the number of IT misuse incidents continues to escalate despite increasing IS security investments and strong management emphasis on behavioral security issues, such as policy development and employee education and training [Ernst and Young, 2011].

To elucidate our understanding of IT misuse, future research should look outside the boundaries of traditional IS security research for theoretical explanations [Willison and Warkentin, 2012]. Theories of the employee–organization relationship, such as organizational justice, social exchange, and job satisfaction, are potentially fruitful approaches.

The organizational behavior (OB) literature supports the employee–organization relationship as a predictor of counterproductive and noncompliant workplace behaviors. Extending this work to the IT misuse domain is a worthwhile endeavor. Researchers can also focus on improved methodological approaches for IT misuse studies. For example, longitudinal investigations of IT misuse are largely absent from the current literature. Such research is warranted (and perhaps necessary), considering that IT misuse likely varies as a result of organizational initiatives, events that an employee encounters during the course of the day, and/or employee moral development (which changes with age). Future IT misuse studies can also utilize the growing number of secondary data sources that publicize data security breaches. Although the difficulties in obtaining actual IT misuse incidents is well documented [Kotulic and Clark, 2004], this situation has changed in recent years with websites such as [privacyrights.org](http://privacyrights.org) and [datalossdb.org](http://datalossdb.org) publishing insider security incidents. The CERT Insider Threat Center has also published reports of actual IT misuse cases on their website ([www.cert.org/insider\\_threat/](http://www.cert.org/insider_threat/)). These data sources provide opportunities for rich, detailed analyses of actual IT misuse cases, which can further our understanding of this phenomenon.

## VI. REFLECTION AND CONCLUSION

This article takes a distinctive perspective in describing the current state of research focusing on the dark side of IT use related to five key areas: technostress, information overload, multitasking, technology “addiction,” and misuse. Research occurring in these areas is embryonic and offers significant opportunities for conducting high-impact theoretical and applied research. We have offered guidelines for pursuing research in several streams embedded in each of these domains.

Upon reflection of our five areas of the dark side of IT use, we speculate that they may, in fact, be related and synergetic. For example, inducing technostress may be a means for reducing less-productive interactions with IT and, by doing so, may lead to reduced information overload, multitasking, misuse, and “addiction.” Thus, some level of technostress may be a remedy against other aspects of the dark side of IT use, while increased doses of technostress may have detrimental consequences. Another example: when “addiction” develops, individuals are probably more likely to multitask with IT, develop stress when not able to use IT, and misuse IT to satisfy their cravings. It is also possible that multitasking is associated with “addiction” development, increases in technostress and misuse (e.g., a person may avoid using security measures in order to multitask and better deal with increased overload). This list of examples is not all-inclusive and other associations may be explored. Ultimately, it appears that the dark side of IT use may be a self-perpetuating concept that can negatively affect individual work and family roles, and is comprised of at least five distinct, yet possibly, related aspects. Thus, future research may go beyond examining these dark aspects of IT use in isolation and instead focus on their associations. Investigating IT use in specific work contexts, such as service-oriented enterprises, organizations engaged in product development processes, clinical environments, etc., could reveal interesting aspects of such associations.

Finally, our research and reflections reveal that complex social situations arise at the individual, organizational, and societal levels, whereby the use of IT is both a creator of certain “dark” effects and a harbinger of their antidotes. As an example, while too much information (possible from use of IT) can cause information overload, appropriately structuring and harnessing that information (through intelligent information processing and knowledge-creating algorithms) can reduce such overload. We suggest, therefore, that conducting broader studies that embody positive and negative aspects associated with IT use is required to advance the theoretical boundaries of our understanding of long-term impacts of IT use.

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## ABOUT THE AUTHORS

**John D'Arcy** is an Assistant Professor in the Department of Accounting and MIS, Lerner College of Business and Economics, at the University of Delaware. He received his PhD in Management Information Systems from Temple University. His research interests include information assurance and security, IT risk management, and computer ethics. His work appears in journals such as *Information Systems Research*, *Decision Sciences Journal*, *European Journal of Information Systems*, *Journal of Management Information Systems*, *Communications of the ACM*, *Journal of Business Ethics*, *Decision Support Systems*, and *Computers & Security*.

**Ashish Gupta** is an Associate Professor of Analytics and Information Systems in the College of Business at University of Tennessee Chattanooga. Prior to this, he was an Associate Professor of IS at Minnesota State University Moorhead. He has held visiting positions in Biomedical Informatics department at Arizona State University and Mayo Clinic, Rochester. He received his PhD in Management Science and Information Systems from Oklahoma State University. His interests include information overload, interruptions, workflow, healthcare IT, and healthcare delivery. He has published in several journals such as *IEEE Transactions*, *Decision Support Systems*, *European Journal of Information Systems*, *Communications of the Association for Information Systems*, and *Information Systems Frontiers*.

**Monideepa Tarafdar** is Professor of Information Systems at Lancaster University Management School, Lancaster, UK (prior to Fall 2013, she was Professor of Information Systems at the College of Business and Innovation, University of Toledo). She received her doctorate from Indian Institute of Management Calcutta. Her current research focuses on technostress, IT-enabled business innovation, the IT human resource, developmental IT issues in emerging economies, and IT in healthcare supply chains. She has published in, among others, *Information Systems Research*, *Journal of MIS*, *Journal of Strategic Information Systems*, *Journal of IT, Information and Management*, *Information Technology and Development*, *International Journal of Operations and Production Management*, *International Journal of Production Economics*, *Supply Chain Management: An International Journal*, *Sloan Management Review*, and *Communications of the ACM*.

**Ofir Turel** is a Professor of Information Systems and Decision Sciences at the College of Business and Economics, California State University, Fullerton, and a visiting professor at the Brain and Creativity Institute, University of Southern California. His research interests include a broad range of behavioral and managerial issues in various information systems contexts. His work has received several national and international awards. He has published over forty articles in journals such as *MIS Quarterly*, *Journal of Management Information Systems*, *European Journal of Information Systems*, *Communications of the ACM*, *Information & Management*, *Journal of Information Systems*, *Behavior & Information Technology*, *Telecommunications Policy*, *Group Decision and Negotiation*, and *Communications in Statistics*.

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