Information and Communication Technology: Understanding Their Dark-Side Effects

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> "We are letting technology take us places that we don't want to go"
>
> Sherry Turkle, TED talk, 2012, https://youtu.be/t7Xr3AsBEK4?t=144

1 The Dark Side of Information and Communication Technologies

Information and Communication Technologies, hereafter referred to as ICT, are a double-edged sword. While they have been used to generate unquestionable benefits for organizations and societies (e.g. efficiency in information processing, innovations in business processes, better products and services[1]), we are now seeing a plethora of negative phenomenon associated with them. Increasingly referred to as the dark side of ICT use (e.g. Tarafdar et al. 2015a), these include among others, technostress, technology addiction, and information and communication overload. As these types of phenomena emerge and become observable, they are generating a buzz of

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[1] The benefits have been analysed and explained at length for the past four to five decades in various management disciplines, most notably in Management Information Systems, Organizational Behaviour, Strategic Management and Operations Management. The interested reader is directed to the literature (i.e. journals, conferences and texts) in these disciplines.

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substantive and considerable scholarly commentary. For example, we know that '*In a society that is constantly speeding up, technology has provided excellent means for achieving competition-driven goals. But in so far as it affects employees, it may have given rise to unexpected side effects such as stress and distress*' (Mano and Mesch 2010, p. 67). What is ironic is that the very qualities of ICT that make them useful, such as constant availability and reliability, quick and complex information processing capabilities, and user-friendly interfaces, are also key enablers of these dark-side phenomena. For example, while we value the ease and convenience of on-demand email, we also know that it is costly in terms of time and productivity. For instance, the daily cost of reading email for a large UK firm with 2850 email users is £40,848, and the cost per year over £9.8 million (Jackson et al. 2006).

Shoshana Zuboff, in 1988, described '*informating*' (Zuboff 1988), the ability to track data as they are generated and processed, as a double-edged effect that can both lead to efficient work processes and isolation and control of individuals who execute them. As early as in the 1960s, Marshall McLuhan warned us that the '*medium is the message*', in that although we might start off by designing and shaping our information processing and communication tools according to our needs and requirements, eventually they would shape what we do, in unexpected and unforeseen ways. Winding through the technology maze to the present, in 2018, the effects of these phenomena are beginning to be seen among individuals as well as collectives, spanning organizations and business enterprises, and society at large. We examine in this chapter, what some of these dark-side phenomena are, how they affect our social and business enterprises, and what can be done by way of their mitigation.

2 Dark-Side Phenomena: Technostress, Technology Addiction, Overload from Computer-Mediated Communication

Technostress is the stress that individuals experience due to their use of ICT (e.g. Tarafdar et al. 2017). This phenomenon illustrates that ICT place various demands on the individual (e.g. Cooper et al. 2001; McGrath 1976), which the individual appraises as threats that he or she is unable to meet, and faces the possibility of adverse consequences as a result. The very characteristics of ICT that we value such as their ubiquity, reliability, ease of use, mobility and constant presence can present such demands, as can ICT-related events such as system breakdown and ICT-created interruptions (Galluch et al. 2015). When faced with these demands, the individual experiences the presence of technostress creating conditions, known as techno-stressors. The literature reveals a number of techno-stressors (e.g. Ragu-Nathan et al. 2008; Tarafdar et al. 2007). Techno-overload forces the user to do more in order to use the technology, such as understanding and using a plethora of features, and having to adhere to extra requirements such as security-related tasks (D'Arcy et al. 2014; Reinke et al. 2014; Tarafdar et al. 2007). Techno-invasion is

the stressor because of which individuals feel that their non-work time is invaded by work demands (Tarafdar et al. 2007); they are faced with expectations of constant availability and immediate response vis-à-vis their work (Barber and Santuzzi 2015; Day et al. 2012). Individuals experience techno-uncertainty when they feel that the ICT they use change quickly and they have little control over the change-related decisions, use and policies (Tarafdar et al. 2007). Techno-insecurity embodies the feeling of insecurity that individuals face when they feel that their colleagues may know more about new technologies than they do (Tarafdar et al. 2007). Techno-complexity is the techno-stressor that individuals face when they find ICT difficult to use and find themselves on a constant learning curve in order to use frequently changing ICT, understand their complications and deal with the hassles in dealing with them (Barber and Santuzzi 2015; Barley et al. 2011, p. 201; Day et al. 2012; Galluch et al. 2015; Tarafdar et al. 2007). Individuals who are digitally literate and involved, and have a positive attitude towards ICT to begin with, may experience lower levels of techno-stressors (Barley et al. 2011; Tarafdar et al. 2015b; Tarafdar et al. 2010). One application that is known to be an important cause of technostress is social media such as Facebook. This is because they come with expectations to attend to social needs of others, and to produce and consume excessive information about other people's lives which can be difficult to process. At the same time, not doing so can lead to an experience of fear of missing out on interesting updates if one cannot process such information and an overload of social media-related activities such as posting and browsing at the cost of others (Maier et al. 2014).

Technology addiction happens when individuals engage in pathological use of ICT. Such use stems from a maladaptive and harmful dependency on ICT. It tends to be obsessive compulsive and out of control, and to the detriment of other important activities and commitments (Turel et al. 2011; Xu et al. 2012). Addiction to ICT often embodies a dangerous and self-fulfilling promise—those with higher levels of addiction to a particular application consider that application to be more useful, easier and more fun to use, than non-addicts (Turel and Serenko 2012)—which has the potential to lead to never-ending cycle of addictive use of ICT. The American Psychiatric Association describes it as 'pathological computer use' (Young 2010, p. 91). How addicted an individual is may depend on their social-demographics, personality traits (Kim et al. 2008), whether or not the ICT applications they use provides opportunities for hedonic and entertainment-related use and to what extent it satisfies the individual's needs (Young 2010). Individuals may get addicted to the use of ICT, especially when they enjoy using it. What is more, as is the case with other forms of addiction, they may be subject to withdrawal and personal relapse if they stop using those applications. As in the case of technostress, the most common ICT that people are addicted to are social networking applications such as Facebook (Turel and Serenko 2012; Xu et al. 2012). Other ICT include the Internet in general, online gaming and, ironically enough, work email (Weinstein and Lejoyeux 2010; Xu et al. 2012). Among ICT devices that individuals are most addicted to are laptops and smartphones, ostensibly because they can run a number of different applications and through that can transport us into different worlds. Indeed, smartphone addiction has emerged as one of the most widespread forms of IT addiction (Montag et al. 2016).

We see behaviours such as employees hooked inexorably to their smartphones, never being disconnected from their work, and browsing work-related email or social media conversations as among the last things they do before going to sleep and the first thing after waking up (Montag et al. 2016).

The dark side of ICT is also revealed in an overload of computer-mediated communication such as use of email. It has received considerable newspaper coverage in recent years, with titles such as 'checking your emails outside of work really IS bad for your health' (capital letters in original) (Davies 2015). Computer-mediation communication is associated with a wide range of detrimental outcomes (Stich et al. 2015). Because of its pervasiveness, employees are increasingly 'working anytime, anywhere' (Eurofound and the International Labour Office 2017) and are expected to remain constantly available, potentially resulting in increased work life imbalance (Derks et al. 2015), job burnout and health-related problems (Barber and Santuzzi 2015). Many choose of their own will to become and remain available through ICT 'around-the-clock' (Matusik and Mickel 2011), seeing it as an imperative for professional advancement. Some, referred to as 'Crackberries', even wait for *the* awaited communication (Mazmanian et al. 2005) and constantly check their smartphones as they do so. ICT applications can be used quickly and conveniently; individuals thus also face ever-increasing volumes of communication, and, therefore, increased feelings of overload (Dabbish and Kraut 2006) and more frequent interruptions (Jackson et al. 2006). However, and at the same time, such applications are not very suitable for efficiently transmitting the rich panel of human emotions and visual cues. As a result, cyber rudeness abounds and yet at the same time civil messages can be misinterpreted, leading to even higher levels of frustration, stress and conflict escalations (Friedman and Currall 2003). Although very few would dispute that computer-mediated communication has facilitated dispersed collaboration and information exchange, the literature surely shows that, insofar that it affects employees, detrimental side effects have also flourished.

3　Effects of Dark-Side Phenomena

These dark-side phenomena are associated with various negative outcomes. Technostress, for example, is associated with a lack of job satisfaction and organizational commitment, intentions to leave one's organization, role overload, role conflict (Ragu-Nathan et al. 2008; Tarafdar et al. 2007), as well as job-related anxiety and depression (Sprigg and Jackson 2006). Further, technostressed individuals are not able to use ICT properly, which is ironical, given that one of the expected outcomes for the implementation of ICT is that people should use them. Such individuals suffer from low abilities to use ICT for innovation and productivity at work, low satisfaction with the ICT they work with (Tarafdar et al. 2010, 2015b) and a lack of willing compliance with requirements such as timely response to email and adherence to security requirements (Barber and Santuzzi 2015; D'Arcy et al. 2014). Even more alarmingly, they suffer from reduced well-being in that they experience increased

exhaustion, burnout and strain (Barber and Santuzzi 2015; Barley et al. 2011; Day et al. 2012; Reinke and Chamorro-Premuzic 2014; Srivastava et al. 2015). Indeed, the physical symptoms are so strong that the incidence of stress hormones such as alpha amylase (Galluch et al. 2015) has been observed when individuals experience ICT-related hassles such as system breakdown. Individuals who experience high levels of techno-stressors may ultimately stop using an ICT application altogether (Maier et al. 2015).

Addiction to ICT similarly comes with a myriad of negative consequences. Perhaps, the most prominent of these is work life conflict (Turel et al. 2011), brought on primarily by addiction to readily available work email on smartphones and tablets. Addiction to mobile phones can also lead to anxiety and insomnia (Jenaro et al. 2007), mood disturbances and antisocial behaviours (Griffiths et al. 2010), together with general psychological distress (Beranuy et al. 2009). In extreme cases, it may lead to lack of satisfaction with the offline (and one would imagine, the real) world (Bruner 2006; Hussain and Griffiths 2009)! Internet addition in general is detrimental to various aspects of the individual's personal life, in the form of depression (Iacovelli and Valenti 2009), loneliness (Morahan-Martin and Schumacher 2000) and reduced self-esteem (Niemz et al. 2005). Within the Internet milieu, another widely prevalent form of ICT addiction is that to social media and instant messaging. In adults, this can cause loss of relationships due to overuse, and in students it has been shown to be associated with low academic performance (Huang and Leung 2009). An extreme and socially dangerous form of addiction is that of cybersex and cyberporn, which can destroy an individual's family life and social relationships, leading to social isolation (Daneback et al. 2005; Schwartz and Southern 2000).

Individuals addicted to ICT can also cause problems for their organizations. Mobile email addiction increases the user's work overload, which in turn reduces his or her organizational commitment and work productivity (Turel and Serenko 2010). Employees addicted to work use of smartphones at night show lower productivity at work the following day (Lanaj et al. 2013). Indeed, employees who become addicted to work-related ICT have been known to litigate against and hold their employers legally responsible, for both work and personal problems stemming from such addiction (Kakabadse et al. 2007)! Overall, therefore, addiction to ICT can reduce the individual's well-being, change his or her social relationships and interaction patterns for the worse, adversely affect his or her work performance, and in doing so create a significant economic burden.

Overload from computer-mediated communication lengthens people's workdays (Barley et al. 2011). Handling email and other communication media is a time-consuming task. Reading email alone can consume a significant portion of the workday (Jackson et al. 2006). Interruptions from computer-mediated communication can lead to significant time loss, given that recovering from such interruptions and re-engaging in the primary task following an interruption can take up to fifteen minutes (Jackson et al. 2001). Such productivity losses are the greatest for employees who highly depend on computer-mediated communication to accomplish their work, given their higher exposal to such (Karr-Wisniewski and Lu 2010). These include employees who telework or work in virtual team working. The social effects of

computer-mediated communication-related overload are even more profound. They include expanding working hours beyond office time effectively 'leashing' employees to their workplaces (Mazmanian et al. 2005). Constant availability enabled by computer-mediated communication is generally associated with increased work life conflict and burnout (Derks et al. 2015; Matusik and Mickel 2011). What is ironical, however, is that in spite of such consequences, individuals might crave for and take pride in constant availability (Matusik and Mickel 2011).

4 Mitigating Dark-Side Phenomena

Fortunately, research also shows that there are ways to mitigate or at least address the negative consequences of these dark-side phenomena. Such mitigation factors can be present at the level of the individual, the organization and the society. However, while a few mitigating mechanisms have been suggested (Tarafdar et al. 2015a, b), research in this area is relatively sparse.

In general, mitigation mechanisms in organizations could be interventions that make a particular dark-side phenomenon less likely to occur such as reducing the number of ICT design features likely to cause stress, overload or addiction for instance. Or, they might be directed at the individual to alleviate his or her dark-side behaviours and attitudes after they are manifested. These could include workplace mechanisms directed towards employees such as education/counselling, awareness, institutional support, job/role redesign and altered reporting structures. In the context of technostress, for example, factors that decrease or inhibit the extent of these negative outcomes include IS management mechanisms such as literacy facilitation, technical support, end user involvement, innovation support, co-worker support and support manuals (Day et al. 2012; Ragu-Nathan et al. 2008; Soucek and Moser 2010). To help employees deal with computer-mediated communication overload, for example, Volkswagen has stopped routing emails to certain employees out of the office (BBC News 2012). A less drastic measure can be to decrease the email checking frequency settings of employees' inboxes in order to reduce exposure to ICT interruptions (Jackson et al. 2006). Some authors go as far as to suggest checking emails only two to four times per day (Gupta et al. 2011). A caveat to such interventions is that emails may pile up in the employees' absence or checking gaps, potentially resulting in further overload (Dabbish and Kraut 2006). A problematic issue, however, is that such one-size-fits-all interventions generally fail to consider that individuals differ in their tolerance and preferences for ICT use. Employees who enjoy and feel empowered remaining constantly available through ICT (Matusik and Mickel 2011) can grow dissatisfied with interventions taking their prided and addictive smartphone away (Mazmanian et al. 2005). However, those employees need to understand that the messages they send and the interactions they initiate may impact their recipients. To accommodate both their preferences and those of others, organizations may favour interventions aiming at raising awareness over ICT-related problems. This can take the form of peer support groups, impactful but time-bound

email bans (Mark et al. 2012), or organizational codes of ICT conduct. Furthermore, email training such as how to write succinct emails has been found to reduce email overload (Soucek and Moser 2010) and may, therefore, deserve to be more developed in organizations.

At the societal level, policies can serve as powerful mitigation mechanisms. For example, we are now seeing government policies potentially shaping IT use activities such as checking email. National policies which are relevant for dark-side IT phenomena may include, for instance, restricting access to potentially harmful or dangerous websites (for instance, child pornography) (Griffiths et al. 2010) and developing appropriate industry-specific regulations, such as in the financial sector. They could also comprise educational and social support at the level of the family and other social units, for creating awareness of IT addiction, cyberbullying, Internet pornography, privacy problems and intellectual property theft.

The personality of the individual may influence the extent to which he or she experiences these dark-side phenomena. For example, technostress has been found to be more prevalent among those who with the personality orientations of neuroticism, agreeableness and extraversion (Srivastava et al. 2015). At the same time, those with greater technology self-efficacy, technology competence, and control over their tasks at work (Tarafdar et al. 2015a, b) experience less technostress. Aside from these, individuals also respond to dark-side phenomenon by actively and constructively coping with them. They may cope through actions that are largely emotional, such as venting, seeking social support and psychological distancing themselves from the ICT and resisting its use (Beaudry and Pinsonneault 2010), in some cases discontinuing the use of stressful ICT altogether (Maier et al. 2015). They may also cope through more instrumental means such as experimenting with new ICT features to fit existing tasks and workflows, consciously sticking to the minimum required use (Beaudry and Pinsonneault 2005), altering their task alterations to suit the requirements of new ICT, adapting their use of ICT (Beaudry and Pinsonneault 2005) and psychologically disengaging themselves from any requirements associated with ICT use through non-compliance (D'Arcy et al. 2014).

5 What Next?

So where do we go from here? Two centuries ago, in what was the dawn of industrialization, textile workers in Northern England raised their own army to wreck their newly introduced machinery. The Luddites rose up fiercely against technology-borne automation of what used to be the blue-collar jobs of the cotton mills. Today, algorithm-based business processes, together with artificial intelligence and cognitive computing, are having similar effects on white-collar knowledge-centric jobs such as law, IT services, financial trading and accounting (e.g. Davenport and Kirby 2016). This comes with unexpected and negative effects. For instance, high-speed financial trading systems have been known to cause 'flash crashes' (Tracy and Patterson 2014). A key reason for these crashes is the use of super-fast, automated trading

algorithms that obtain asymmetrically early access to price-related information published by trading firms through high-speed IT networks. During one such crash that occurred in May 2010, the Dow Jones Index fell an unprecedented 1000 points in the space of a few minutes, as USD 1 trillion was wiped off the value of markets; profits from such crashes often accrue to a miniscule percentage of those who participate in the stock markets.

In parallel, we are witnessing two other developments. One is that the use of ICT now takes place both continually, that is, not confined to a specific physical work or home or leisure time or location, and seamlessly across life activities, that is, not easily classified as 'work' or 'non-work'. The same smartphones, tablets and laptops are used for office email, Facebook browsing, Snapchat posting and WhatsApp texting, in a continual flow of myriad activities that are hard to distinguish or classify. This is particularly more so for digital natives (Vodanovich et al. 2010). And two, over time, individuals get used to the 'upped' doses of ICT they face. What initially seems like difficult 'multitasking' across different applications at work becomes more the norm as we increase screen real estate and computing power to simultaneously tackle, for example, word processing, web browsing, searching and emailing. What starts off as being 'work life imbalance' becomes 'connectedness', as we check our smartphones more and more frequently, sometimes the last thing before sleep and the first thing in the morning, often from an unknown and difficult to articulate 'fear of missing out' on we know not what. Winston Churchill once said, '*First we shape our buildings and then they shape us*'. In this case, the very features we have designed into ICT, such as reliability, user friendliness and flexibility, are changing the way we use them, and through that, changing our ways of living, working and interacting.

Computers can surely cause us suffering. And yet as history has shown and as is evident from our discussions here, turning back the clock is not an option, neither is endless and perhaps fruitless harping on technologically dystopic futures. It is rather obvious to those that use ICT (which includes most of us) that as new ICT are developed, new effects emerge. What we need to do instead is to remain open to and be courageous about, investigating the unexpected and negative consequences of ICT use in our social, economic and business enterprise, with a view to addressing, mitigating and managing them. It is important and imperative to develop scholarly understanding of such phenomena and understand their organizational effects on efficiency, productivity, innovation and financial performance, and their social effects on relationships, well-being and life habits.

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