Work-Life Balance in the Digital Workplace: The Impact of Schedule Flexibility and Telecommuting on Work-Life Balance and Overall Life Satisfaction

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Designing the digital workplace of the future – what scholars recommend to practitioners

Completed Research Paper

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Abstract

The digital workplace is widely acknowledged as an important organizational asset for optimizing knowledge worker productivity. While there is no particular research stream on the digital workplace, scholars have conducted intensive research on related topics. This study aims to summarize the practical implications of the current academic body of knowledge on the digital workplace. For this purpose, a screening of academic-practitioner literature was conducted, followed by a systematic review of academic top journal literature. The screening revealed four main research topics on the digital workplace that are present in academic-practitioner literature: 1) Collaboration, 2) Compliance, 3) Mobility, and 4) Stress and overload. Based on the four topics, this study categorizes practical implications on the digital workplace into 15 concepts. Thereby, it provides two main contributions. First, the study delivers condensed information for practitioners about digital workplace design. Second, the results shed light on the relevance of IS research.

Keywords: Digital workplace, Collaboration, Compliance, Mobility, Stress, Overload

Introduction

"It would've been better for me to use two separate phones and two email accounts. I thought using one device would be simpler." With these words, Hillary Clinton justified her use of a personal email account for work-related emails during her time as secretary of state (Schmidt 2015). Her news conference was preceded by an intensive political debate about the legitimacy of her IT use for work. Although the incident revealed that such behavior is likely to be common practice for many politicians, Clinton finally was urged to present her "mea culpa", admitting a personal failure (Kaneshige 2015). The debate about Clinton's personal email controversy resembles challenges that organizations face in the design of the digital workplace. Technological advances and demographic changes raise questions for managers of knowledge workers, who are responsible for optimizing the design of workplaces and technology.

In his famous piece on "Enterprise 2.0", McAfee (2006) raised the hopeful question "Do we finally have the right technologies for knowledge work?" (p. 21). Almost ten years later, it seems that we are still far from answering the question with an undisputable "Yes". While social collaboration through wikis, portals, and social media have emerged at the workplace, email communication has likewise increased and continues to grow (Radicati 2014). Andriole (2010) found that many organizations struggle with the adoption of Web 2.0 technologies, with business impacts felling short of expectations. While earlier conceptualizations on the digital workplace were confined on computer use at work with Internet access (Benson, Johnson, and Kuchinke 2002), the notion has meanwhile evolved to a broader concept that mirrors the manifold technological development through the digitization of many areas of life. Gartner (2015) states the digital workplace "enables new, more effective ways of working; raises employee engagement and agility; and exploits consumer-oriented styles and technologies". Tubb (2015), member of the "Digital Workplace Group", defines the digital workplace more briefly as "the collection of all of the digital tools provided by an organization to allow its employees to do their jobs".

The digital workplace is widely acknowledged as an important organizational asset for optimizing knowledge worker productivity. It is often argued that organizations are forced to act and must embrace the changing nature of digital work (D'Arcy 2011; van Heck, van Baalen, van der Meulen, and van Oosterhout 2012; Stieglitz and Brockmann 2012). However, many organizations are still concerned about the design of the digital workplace, for instance, how to balance organizational agility and organizational control (Mazmanian, Orlikowski, and Yates 2013). Similar to Clinton's behavior, many employees bypass IT departments by using their own tools in order to get their job done (Harris, Ives, and Junglas 2012). Thus, the question arises how to yield personal productivity from consumer-oriented technologies at the workplace without putting important corporate data at risk (Köffer, Ortbach, and Niehaves 2014).

The discourse about designing the digital workplace of the future is difficult to grasp for researchers and practitioners. While consultants and practice companies have started to address the topic as a whole, there is yet no particular research stream on the digital workplace. However, scholars have conducted intensive research on related topics. This article aims to summarize the practical implications of this current academic body of knowledge on the digital workplace. Thereby, it adopts the aforementioned definitions of the digital workplace. In other words, its objective is to investigate the question *how digital tools and applications in the workplace should be deployed in order to enable more effective ways of working, raising employee engagement and agility?*

In doing so, this study provides two main contributions. First, it delivers condensed information for practitioners that are still concerned about questions regarding digital workplace design. To this end, the results are presented with particular regard to understandability for both researchers and practitioners. Second, the results shed light on the relevance of IS research, i.e. in how far researchers' implications for practice from studying digital workplaces provide value to a non-academic audience.

The remainder of this paper is structured as follows. The next section briefly describes the methodological approach, which primarily has been a structured literature review. Next, the results are presented along research topics that were identified from a screening of articles in academic-practitioner journals. The Discussion section provides a summarized overview of the recommendations, including an evaluation of their feasibility and further considerations for their practical implication. The paper concludes with a summary of the results as well as an outlook for research on designing the digital workplace.

Method

The aim of this paper is to summarize relevant research on the digital workplace of the future. Figure 1 visualizes the methodological approach. Since this study primarily aims to provide relevant information for practitioners, the search started by a careful review of technology-affine academic-practitioner journals (Straub and Ang 2011), such as California Management Review, Communications of the ACM, Harvard Business Review, MIT Sloan Management Review, and MIS Quarterly Executive.

Figure 1. Research methodology
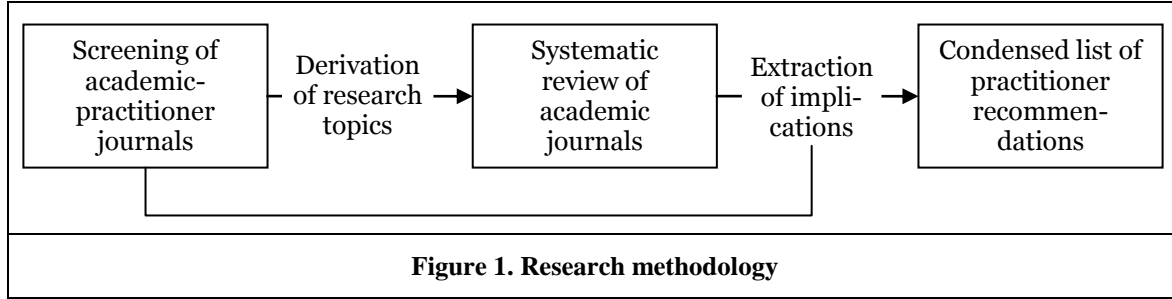
The screening of the academic-practitioner literature led to the identification of 18 publications and four research topics on the digital workplace of the future: 1) Collaboration, 2) Compliance, 3) Mobility, and 4) Stress and overload. The research topics were used as "key concepts" (Webster and Watson 2002) for further classification of research articles and practitioner recommendations.

The next step was a systematic review of the academic literature. Given that researchers have addressed the key concepts for several years, the review focused on mature and rigorous publications. Thus, the search was restricted to prestigious journal outlets (A-Journals). It was further restricted on publications from 2006 or later for two reasons: First, the article of McAfee (2006) was seen as seminal work, describing ongoing changes in the digital workplace. Second, ten years are a typical period for literature reviews (Rowe 2014). The details of the systematic literature review are described in the Appendix.

Table 1. Concept and keyword derivation using foundational literature		
Journal name	Journal type	# Articles*
European Journal of Information Systems	Academic	15 (8)
MIS Quarterly	Academic	11 (3)
Journal of Management Information Systems	Academic	9 (1)
Information Systems Journal	Academic	9 (5)
MIS Quarterly Executive	Practitioner	7
Information Systems Research	Academic	6 (1)
MIT Sloan Management Review	Practitioner	4
Journal of Strategic Information Systems	Academic	3 (1)
Communications of the ACM	Practitioner	3 (2)
Harvard Business Review	Practitioner	3 (2)
Organization Science	Academic	3 (2)
Journal of Information Technology	Academic	2 (2)
Journal of the Association for Information Systems	Academic	2 (1)
Academy of Management Journal	Academic	1
California Management Review	Practitioner	1
Sum		79 (28)

* In brackets: Articles that did not provide any concrete implications for practitioners

All articles in the result set were analyzed in detail in order to extract their implications for practice. In total, 212 implications could be derived from the result set of 79 publications. Thereby, only explicitly mentioned practical implications were considered, mostly from the discussion or conclusion chapter of the articles. The extracted implications were grouped into broader concepts and subordinated to the research topics, depending on the scope of the articles. Table 1 shows the number of considered articles by journal outlets. A list of all identified articles can be found in the Appendix.

Relevant research topics on the digital workplace

The digital workplace has recently undergone several fundamental shifts. Dery and MacCormick (2012) report of considerable changes from the year 2006 to 2012 in how work is performed, i.e., the value of technology at the workplace has shifted to being always connected with work, with no chance to escape. Cultural norms of professional communication have changed to an always-on mentality (Mazmanian et al. 2013). In addition, several authors point to the rapid proliferations of personal smartphones in private and work contexts (Harris et al. 2012; Stieglitz and Brockmann 2012). Moreover, the number of IS-mediated tasks has further increased for many job functions (Tarafdar, Pullins, and Ragu-Nathan 2015).

The locations of work have also changed considerably. Some companies have partially or fully eliminated traditional offices (Mulki, Bardhi, Lassk, and Nanavaty-Dahl 2009). Literature has noted excessive demands of workplace technology. Tarafdar, D'Arcy, Turel, and Gupta (2014) assume that in relation to workplace technologies "we may be entering an area in which human frailties begin to slow down progress from digital technologies" (p. 61). Table 2 summarizes the research topics of the digital workplace that could be identified through the screening of academic-practitioner literature. It has to be noted that the four topics are not mutually exclusive, i.e., many publications address multiple topics. A detailed overview of the identified literature and their assignment to the research topics is given in the Appendix.

Table 2. Description of research topics from academic-practitioner literature	
Key concept	Description
Collaboration	Use of collaboration technologies, such as social media or group support systems, to enable efficient communication between workers
Compliance	Non-complaint behavior of employees with well-meaning, such as bypassing guidelines or misuse of IT at the workplace
Mobility	Managing the introduction of mobile technologies in the workplace, as well as supporting mobile workers in their work practices
Stress and overload	Negative outcomes of technology (over)use in the workplace, such as technostress, information overload and work-life conflict

First, the concept of *collaboration* resembles that modern technologies are an important aspect to realize new ways of collaborative work in the digital workplace. Typically, this includes the use of software applications like instant messaging, wikis, or document management tools (van Heck et al. 2012; McAfee 2006). In this context, social media applications used within organizations are seen as an enabler of internal collaboration and interaction between employees (Huy and Shipilov 2012; Kane 2015). More sophisticated mobile devices allow those interactions to take place untethered to any location.

Second, many studies attribute considerable workplace changes to the increased *mobility* of work. Dery and MacCormick (2012) note that first smartphones primarily served the purpose of mobile work for a limited number of people. Now mobile IT "has become a critical tool rather than nice to have" (p. 161). The focus of mobile IT has shifted from working mobile to being connected to information sources 24x7. Harris et al. (2012) emphasize that many of the used devices and applications stem originally from the consumer space rather than the enterprise space. This trend, termed IT consumerization, has important implications for work practices. For instance, employees are more likely to transfer privately acquired IT know how to solve work tasks.

Third, the notion of *compliance* resembles that employees are more likely to use IT tools at work that have not been formally approved by the organization, what "may be seen as either a threat or an opportunity" (Harris et al. 2012). Thereby, studies assert that many employees either are unaware of security policies or do commit violations with well-meaning. Ironically, the most common motivations to violate rules might be the desire to be more effective or to help others (Tarafdar et al. 2014).

Fourth, besides the undisputed excellent opportunities technologies offer to increase knowledge worker productivity in the digital workplace, a surprisingly high number of practitioner-oriented studies (10 out of 18) deals explicitly with negative outcomes of technology use in the workplace, such as *stress and overload* – the so called "dark side" of IT. Examples include IT-induced technology stress, misuse, and addiction (Tarafdar et al. 2014; Tarafdar, Tu, Ragu-Nathan, and Ragu-Nathan 2011). The intensified digitalization of the workplace has triggered collaboration overload (Cross and Gray 2013). Moreover, many employees struggle to find the right balance between work and non-work life, since technologies have blurred the line between the two spaces (Sarker, Xiao, Sarker, and Ahuja 2012). Thus, work-life balance has been termed as "an elusive ideal and at worst a complete myth" for senior executives (Groysberg and Abrahams 2014 p. 60).

Results

The results of the review of academic literature are presented along the four identified research topics on the digital workplace with practical relevance. Recommendations from practitioner literature and academic journals will be presented together using one result table for each topic. To ensure a high validity of the implications, the result tables only display those concepts that were mentioned by at least two independent studies, i.e., the two studies must have different authors and implications must be based on different data collected. The total number of articles that recommended a particular concept is used for ordering the tables and shown in brackets in the first column. However, this is for orientation purposes only and should not be interpreted as importance of the concept.

Collaboration

The analysis of the 24 articles that deal with the research topic of collaboration revealed eight distinct concepts of practitioner recommendations. Table 3 summarizes all recommendations and provides exemplary quotations from the related articles.

Several authors see the need to improve relationship building between users of collaboration tools. Hence, it cannot be assumed that the pure existence of Enterprise 2.0 tools, such as social media applications, will lead to better collaboration within the company. Instead, managers must actively promote their use to reach the goals of such initiatives (e.g., Kügler, Smolnik, and Kane 2015). Similarly, scholars see a strong necessity to provide adequate support and training for end users. In doing so, organizations will profit in two ways: First, training can be focused on a better exploration and feature use of collaboration technologies to increase knowledge worker productivity (e.g., Huy and Shipilov 2012). Second, training is directed to eliminate inefficient and unnecessary communication efforts to ultimately reduce overload (e.g., Cameron and Webster 2013).

Another frequently mentioned practical implication relates to the segmentation of the workforce, based on different work practices and work requirements. For instance, Cross and Gray (2013) find that "only some individuals improve their productivity when using social media, while others experience significant negative effects" (p. 54 f.). Moreover, researchers acknowledge that the communication and collaboration requirements of employees vary (Cameron and Webster 2013), so that engaging in such behaviors, for example through social networks, is not crucial for every job profile.

Table 3. Practical implications for collaborative work in the digital workplace		
Concept	Example practical implications	Recommended by
Enable social interaction (5)	"Organizations need to build opportunities for relationship-building … that include managers and other important stakeholders." (Kietzmann et al. 2013 p. 294) Encourage employees with no or a small number of ties to interact with other employees." (Zhang and Venkatesh 2013 p. 24).	• Davis (2013) • Kietzmann et al. (2013) • Kügler et al. (2015) • Magni et al. (2012) • Zhang and Venkatesh (2013)
Provide support and training for users (5)	"Training on how to appropriate technology may be the most important type of training for teams." (Fuller and Dennis 2009 p. 15) "Employees should be trained to choose communication channels that fit best." (Cameron and Webster 2013 p. 367)	• Cameron and Webster (2013) • Fuller and Dennis (2009) • Huy and Shipilov (2012) • Magni et al. (2012) • Wang and Haggerty (2011)
Segment employees (5)	"Organizations should examine each position's communication requirements and if their employees' jobs require them to be anytime, anywhere." (Cameron and Webster 2013 p. 367) "Given the diversity of work practices and … no one size fits all when it comes to the manner in which teams incorporate the collaboration technology." (Maruping and Magni 2015 p. 14)	• Cameron and Webster (2011) • Fuller and Dennis (2009) • Koch et al. (2012) • Maruping and Magni (2015) • Zhang and Venkatesh (2013)
Empower employees (3)	"Managers are encouraged to cultivate a team atmosphere that empowers team members to take responsibility." (Maruping and Magni 2015 p. 14)	• Galluch et al. (2015) • Kietzmann et al. (2013) • Maruping and Magni (2015)
Demonstrate leadership (3)	Ask authentic and trustful leaders to "build social media communities that emphasize authenticity, pride, attachment and fun." (Huy and Shipilov 2012 p. 80).	• Huy and Shipilov (2012) • Li et al. (2011) • Maruping and Magni (2015)
Monitor work behaviors (3)	"Monitor the virtual work capabilities exhibited by employees on a regular basis and look for opportunities." (Wang and Haggerty 2011 p. 323)	• Cross and Gray (2013) • Magni et al. (2012) • Wang and Haggerty (2011)
Consider individual characteristics (2)	"Managers can make hiring decisions based on individuals' levels of individual virtual competence and experiences with virtual work and online daily life." (Wang and Haggerty 2011 p. 323)	• Li et al. (2011) • Wang and Haggerty (2011)
Develop pilot strategies (2)	For systems deployment, there is a "need for pilot deployment strategies, particularly where collaboration technologies are concerned." (Fuller and Dennis 2009 p. 15)	• Fuller and Dennis (2009) • Huy and Shipilov (2012)

Compliance

Eleven concepts of practitioner recommendations could be identified in the 17 publications identified for the research topic of compliance (Table 4). Most studies view the employees as weakest link in the corporate IT security defense (e.g., Boss, Kirsch, Angermeier, Shingler, and Boss 2009). Not surprisingly, many articles emphasize the role of policies and guidelines, combined with formal sanctions. Several studies show that employees do not fully understand existing guidelines or even do not know them at all. This missing awareness is an important antecedent for security violations (Bulgurcu, Cavusoglu, and Benbasat 2010). Consequently, studies recommend enhanced user training to increase information security awareness, especially for susceptible employees. Scholars call also for a reformulation of guidelines to be simple, consistent, and understandable (e.g., D'Arcy, Herath, and Shoss 2014).

However, other studies acknowledge that other mechanisms are more effective than policies and potential sanctions. Examples are a better involvement of users in the design of security policies (e.g., Tarafdar et al. 2014), or creating an organizational culture that supports adherence to policies (Hsu, Shih, Hung, and Lowry 2015). Four studies were found that even promote incentivizing employees to adhere to security guidelines (e.g., Chen, Ramamurthy, and Wen 2012). Those strategies are based on the assumption that "employees will likely ignore security policies if they are solely evaluated based on their job or business outcomes" (Guo, Yuan, Archer, and Connelly 2011 p. 226). Liang, Xue, and Wu (2013) conclude that the effectiveness of rewards depend on whether employees are promotion or preventions-focused. In contrast, Boss et al. (2009) do not find that rewards do contribute information security policy compliance, and thus recommends rather on formal sanctions.

Table 4. Practical implications for compliant work in the digital workplace		
Concept	Example practical implications	Recommended by
Define policies and guidelines (9)	"Organizations need to implement internet use policies consistently across all employees." (Li, Sarathy, Zhang, and Luo 2014 p. 497) "Punishment is a viable solution to ensure that employees comply with the information security policies." (Myyry, Siponen, Pahnila, Vartiainen, and Vance 2009 p. 135) "Provide guidelines for their employees about relevant and effective uses of technologies." (Leclercq, Isaac, and Kalika 2014 p. 555) "Managers should emphasize the specification of policies and evaluation of those policies for non-compliance." (Boss et al. 2009 p. 160)	• Boss et al. (2009) • Chen et al. (2012) • D'Arcy et al. (2014) • Herath and Rao (2009) • Leclercq et al. (2014) • Li et al. (2014) • Liang et al. (2013) • Myyry et al. (2009) • Siponen and Vance (2010)
Provide support and training for users (8)	"Security training and education should enable end users to have a good understanding of how … security violations will affect their job performance." (Guo et al. 2011 p. 226). "Integrate IS security training with normal business communication efforts in order to eliminate employees' perceptions of IS security as a separate issue from business." (Puhakainen and Siponen 2010 p. 775) "Managers should ensure that employees fully understand what behaviors are expected … through effective security, education, training, and awareness initiatives." (Hsu et al. 2015 p. 294)	• Boss et al. (2009) • D'Arcy et al. (2014) • Guo et al. (2011) • Herath and Rao (2009) • Hsu et al. (2015) • Li et al. (2014) • Puhakainen and Siponen (2010) • Siponen and Vance (2010)
Consider individual characteristics (5)	"Employees may be identified through questionnaires that gauge their value judgments." (Li et al. 2014 p. 498) "Managers should pay attention to employees with low commitment, because those employees are less likely to perform their jobs well and unwilling to help others." (Hsu et al. 2015 p. 294)	• D'Arcy et al. (2014) • Hsu et al. (2015) • Li et al. (2014) • Liang et al. (2013) • Myyry et al. (2009)
Incentivize employees (5)	"Organizations … need to consider intangible rewards … to enhance moral standards." (Chen et al. 2012 p. 179) "Both reward and punishment can effectively control employees' IT compliance behavior … rewards are only effective for those whose promotion focus is high." (Liang et al. 2013 p. 291)	• Bulgurcu et al. (2010) • Chen et al. (2012) • Guo et al. (2011) • Hsu et al. (2015) • Liang et al. (2013)
Rethink organizational culture (5)	"Creating a security-aware culture within the organization will improve information security." (Bulgurcu et al. 2010 p. 542) "Managers can improve security compliance by enhancing the security climate in their organization." (Herath and Rao 2009 p. 118)	• Bulgurcu et al. (2010) • Herath and Rao (2009) • Hsu et al. (2015) • Leclercq et al. (2014) • Myyry et al. (2009)
Align security with user objectives (3)	"When implementing a security policy, IS management should first address what the policy means for end users. Does it require extra effort to help them do their jobs?" (Guo et al. 2011 p. 225)	• Bulgurcu et al. (2010) • Guo et al. (2011) • Myyry et al. (2009)
Demonstrate leadership (3)	"Lead by example by showing, for instance, how senior leaders … adhere to IT security policies … themselves." (Tarafdar et al. 2014 p. 68)	• Boss et al. (2009) • Puhakainen and Siponen (2010) • Tarafdar et al. (2014)
Empower employees (3)	"Managers can capitalize on several opportunities to involve employees in information security policy formation and training." (Hsu et al. 2015 p. 295)	• D'Arcy et al. (2014) • Hsu et al. (2015) • Tarafdar et al. (2014)
Monitor work behaviors (3)	"If there is no adequate monitoring present, the risk of getting caught is not high enough from the employee viewpoint." (Myyry et al. 2009 p. 136)	• D'Arcy et al. (2014) • Myyry et al. (2009) • Tarafdar et al. (2014)
Enable social interaction (2)	"Improve IS security by activating employees to discuss security through educational sessions." (Puhakainen and Siponen 2010 p. 775)	• Puhakainen and Siponen (2010) • Tarafdar et al. (2014)
Segment employees (2)	"Segment employees by roles and job descriptions and to tailor consumer IT policies to their needs." (Harris et al. 2012 p. 106)	• Harris et al. (2012) • Liang et al. (2013)

Mobility

Table 5 summarizes the recommendations from scholars concerning mobile work at the digital workplace. The list of practical implications from 17 related studies could be aggregated into twelve concepts. Similar to the research topic of collaboration, practitioners are requested to target the specific individual

requirements depending on job roles and tasks. In doing so, studies propose a better fit between the type of mobile technology and job demands is likely to increase productivity (Harris et al. 2012).

Many studies acknowledge that mobile work lacks maturity in organizations. Consequently, authors recommend an improved exchange of work practices between departments and individuals so that people in the organization work more closely together (Elie-Dit-Cosaque, Pallud, and Kalika 2011; Sarker et al. 2012). Such exchange should be fostered through support and training how to use mobile IT to improve personal productivity, whilst ensuring that an increased use does not result in work overload or strain (e.g., Ahuja, Chudoba, Kacmar, McKnight, and George 2007). Thus, organizations can support individual trainings with appropriate organizational norms and guidelines, for example, by defining work ethics about relevant use and effective use of mobile IT (Leclercq et al. 2014).

Furthermore, literature stresses the user-liberating role of mobile IT (Middleton and Cukier 2006). Hence, scholars propose allowing employees to experiment with mobile IT, transferring responsibilities and empowerment of employees, and even incentivizing employees to increase their mobile IS use.

Table 5. Practical implications for mobile work in the digital workplace		
Concept	Example practical implications	Recommended by
Segment employees (6)	"Identify executives' most important use situations and examine the preferences of key users." (Mayer, Bischoff, Winter, and Weitzel 2012 p. 94) "Prioritize and consider employees' demands and wishes by including both enthusiasts and laggards." (Stieglitz and Brockmann 2012 p. 202).	• Dery and MacCormick (2012) • Harris et al. (2012) • Mayer et al. (2012) • Reyt and Wiesenfeld (2015) • Sarker et al. (2012) • Stieglitz and Brockmann (2012)
Enable social interaction (5)	"Find ways to share information about individual and team efforts throughout the organization." (Mulki et al. 2009 p. 68). "Organizations can encourage face-to-face meetings between road workers and the headquarters experts." (Ahuja et al. 2007 p. 12)	• Ahuja et al. (2007) • van Heck et al. (2012) • Kietzmann et al. (2013) • Mulki et al. (2009) • Sarker et al. (2012)
Demonstrate leadership (4)	"CEO leadership … is crucial for a successful transition to a mobile and green high performance workplace." (van Heck et al. 2012 p. 186) Managers must understand how [work] factors influence employees' [role integration] behavior." (Reyt and Wiesenfeld 2015 p. 757)	• van Heck et al. (2012) • Mayer et al. (2012) • Mulki et al. (2009) • Reyt and Wiesenfeld (2015)
Provide support and training for users (4)	"Provide individualized training on getting more functionality from mobile technology." (Dery and MacCormick 2012 p. 170) "We suggest that training in managing life-styles involving virtual work be a part of the support available to … workers." (Ahuja et al. 2007 p. 12)	• Ahuja et al. (2007) • Dery and MacCormick (2012) • van Heck et al. (2012) • Mulki et al. (2009)
Empower employees (3)	"Managers … need to move from a mindset focused on controlling and managing workers to facilitating engagement through fostering high organizational alignment." (Kietzmann et al. 2013 p. 293)	• Ahuja et al. (2007) • van Heck et al. (2012) • Kietzmann et al. (2013)
Incentivize employees (3)	Find "appropriate ways to incentivize mobile workers to co-design new mobile work practices." (Kietzmann et al. 2013 p. 294)	• Harris et al. (2012) • Kietzmann et al. (2013) • Stieglitz and Brockmann (2012)
Allow experi-mentation (2)	"Employees should be allowed to explore the new ways of working, and be provided with training and tools." (van Heck et al. 2012 p. 186)	• Dery and MacCormick (2012) • van Heck et al. (2012)
Consider individual characteristics (2)	"Each employee will have personal responses … to meet personal and organizational requirements." (Dery and MacCormick 2012 p. 169)	• Dery and MacCormick (2012) • Sarker et al. (2012)
Define policies and guidelines (2)	"Set organizational norms for working at home to help remote workers balance work and family roles." (Mulki et al. 2009 p. 66)	• Leclercq et al. (2014) • Mulki et al. (2009)
Monitor work behaviors (2)	"Determine enterprise-specific key performance indicators to measure the success of mobile services." (Stieglitz and Brockmann 2012 p. 202)	• van Heck et al. (2012) • Stieglitz and Brockmann (2012)
Rethink organiza-tional culture (2)	"… reflect on the kind of practices they want to promote through mobile IS use." (Leclercq et al. 2014 p. 555)	• Dery and MacCormick (2012) • Leclercq et al. (2014)
Upgrade enterprise IT (2)	"Broadening the scope of allowable consumer devices … can be a first step to managing adoption of consumer IT." (Harris et al. 2012 p. 104)	• Harris et al. (2012) • Stieglitz and Brockmann (2012)

Stress and overload

Table 6 summarizes additional practical implications from the 25 studies related to stress and overload at the digital workplace. From the list of identified recommendations, eleven concepts could be derived.

Table 6. Implications for mitigating stress and overload in the digital workplace		
Concept	Example practical implications	Recommended by
Provide support and training for users (9)	"It is important to go beyond standard training mechanisms and ensure, through continuing education, involvement, confidence/belief building and technical assistance, that sales professionals … understand why specific technologies are implemented." (Tarafdar et al. 2015 p. 125) "Development stress management strategies… for example, help employees to develop better coping skills". (Srivastava, Chandra, and Shirish 2015 p. 377) "Organizations may want to train their employees to limit the pace of switching and the complexity of conversation topics during multicommunicating." (Cameron and Webster 2013 p. 367)	• Ahuja et al. (2007) • Ayyagari et al. (2011) • Cameron and Webster (2013) • Dery and MacCormick (2012) • Mulki et al. (2009) • Srivastava et al. (2015) • Tarafdar er al. (2011) • Tarafdar et al. (2014) • Tarafdar et al. (2015)
Empower employees (5)	"Managers should encourage organizational initiatives that promote feelings of control over the systems used by workers." (Elie-Dit-Cosaque et al. 2011 p. 224) "Our findings underscore the beneficial effects of giving employees control over when they perform behaviors … more autonomy over enabling technology." (Galluch, Grover, and Thatcher 2015 p. 28)	• Ahuja et al. (2007) • Elie-Dit-Cosaque et al. (2011) • Galluch et al. (2015) • Tarafdar et al. (2011) • Tarafdar et al. (2015)
Consider individual characteristics (5)	"Acknowledge that individuals perceive the relationship between work and life very differently." (Sarker et al. 2012 p. 153) "Take the psychology of their workers into account when communicating about IT." (Elie-Dit-Cosaque et al. 2011 p. 224)	• Dery and MacCormick (2012) • Elie-Dit-Cosaque et al. (2011) • Li et al. (2014) • Sarker et al. (2012) • Srivastava et al. (2015)
Define policies and guidelines (5)	"Design and implement IT use policies that help people self-regulate their use of IT, such as email management." (Tarafdar et al. 2014 p. 68) "Review policies with employees in advance to better articulate the definition of an urgent message versus a low priority message." (Galluch et al. 2015 p. 28)	• Ayyagari and Grover (2011) • Galluch et al. (2015) • Hemp (2009) • Mulki et al. (2009) • Tarafdar et al. (2014)
Demonstrate leadership (4)	"Managers should provide information on when they are available and set guidelines for how and when they will respond to phone calls." (Mulki et al. 2009 p. 68)	• Hemp (2009) • Li et al. (2014) • Mulki et al. (2009) • Tarafdar et al. (2014)
Enable social interaction (4)	"Managers should enable and promote opportunities for face-to-face communication and take steps to help remote employees cope with the challenges of virtual communication." (Mulki et al. 2009 p. 68) "Conduct forums and brown-bad events for people to share stories how they actually use IT." (Tarafdar et al. 2014 p. 68)	• Ahuja et al. (2007) • Elie-Dit-Cosaque et al. (2011) • Mulki et al. (2009) • Tarafdar et al. (2014)
Segment employees (4)	"We caution CIOs against taking the companywide approaches …, such as imposing email blackouts, cutting off access to corporate systems in the evening." (Dery and MacCormick 2012 p. 170)	• Cameron and Webster (2013) • Dery and MacCormick (2012) • Koch et al. (2012) • Sarker et al. (2012)
Allow experi-mentation (3)	"Incentivize employees to find out how they can use IT best by experimenting with features and use strategies." (Tarafdar et al. 2014 p. 68)	• Dery and MacCormick (2012) • Tarafdar et al. (2011) • Tarafdar et al. (2014)
Design technologies (3)	"Build dark-side resistant IT features into IT applications and infrastructure, such as blocking applications." (Tarafdar et al. 2014 p. 68) "Design software that is able to mediate e-mail interruptions by distinguishing urgent messages from those that may be important but don't require immediate attention." (Hemp 2009 p. 87)	• Galluch et al. (2015) • Hemp (2009) • Li et al. (2014) • Tarafdar et al. (2014)
Monitor work behaviors (3)	"Assess stressful impacts of technologies and their causes in the organization." (Ayyagari and Grover 2011 p. 850)	• Ayyagari and Grover (2011) • Cross and Gray (2013) • Ragu-Nathan et al. (2008)
Rethink organizational culture (2)	Create "a general climate that promotes supportive relationships among employees." (Tarafdar et al. 2011 p. 119)	• Dery and MacCormick (2012) • Tarafdar et al. (2011)

In summary, nine studies take the view that user support and training can reduce effects of stress and overload from technology. This training recommendations target particular soft skills of employees, such as how to choose communication channels (Cameron and Webster 2013) or time management strategies (Ayyagari and Grover 2011). Furthermore, scholars promote positive effects through employees that are helping each other. For instance, Tarafdar et al. (2014) propose to conduct forums where employees can share stories about problematic IT use. More general, a supportive work culture, where it is normal to help others in balancing roles should be established (Dery and MacCormick 2012; Tarafdar et al. 2011).

Literature widely agrees that applied measures require a consideration of individual differences, such as the environment people working in or personal characteristic traits. For instance, individuals may have distinct preference about communications styles (Li, Gupta, Luo, and Warkentin 2011), or how to balance work and life roles (Dery and MacCormick 2012; Sarker et al. 2012). Hence, organizational are requested to apply interventions according to these preferences.

Discussion of recommendations

Both practitioner and academic literature provide manifold recommendations for managers for designing the digital workplace of the future. Interestingly, several concepts are valid for multiple research topics identified in this study. The concepts "empower employees", "enable social interaction", "monitor work behaviors", "consider individual characteristics", "demonstrate leadership", "provide support and training for users", and "segment employees" have been mentioned for all four topics.

A relatively high number of recommendations (e.g., concepts like "allow experimentation", "incentivize employees", or "empower employees") promotes an autonomous design of the digital workplace. In turn, other recommendations (e.g., concepts like "monitor work behaviors" and "define policies and guidelines") target to maintain organizational control despite the user-liberating character of consumer-oriented technologies at the workplace. Finally, many scholars opt for a better consideration of individual differences with regard to technological preferences and user characteristics. Table 7 provides an aggregated overview of the practical implications for the four research topics along the continuum from organizational control to user autonomy as well as individual workplace design.

Table 7. Summary of recommendations along the continuum from control to autonomy		
Research topic	Maintain organizational control where this is necessary	Foster user autonomy where this is possible	Develop individual workplace designs
Collabo-ration	• Monitor virtual work behaviors to identify problematic and innovative use of collaboration tools	• Promote team climate that enables self-responsible collaboration. • Enable social interaction between users of collaboration tools • Train managers and users within the context of collaboration tools	• Pay attention to users that have too many collaboration ties or low use of collaboration tools • Match user's IT-related communications preferences with job roles and objectives
Compliance	• Define policies and guidelines supported by formal sanctions that regulate compliant IT use • Constantly monitor violations • Make sure that users understand and internalize the necessity of security guidelines	• Create a security aware culture in the organization • Simplify security procedures in alignment with user objectives • Involve employees in the design and communication of information security policies.	• Provide individual security training contexts with improved relevance for specific job roles • Identify individuals that are susceptible to security violations, either because of their job role and personality traits
Mobility	• Develop organizational norms and guidelines of mobile work • Intend to measure the output of mobile work practices, such as productivity and overload	• Create interpersonal interaction and knowledge sharing about mobile work practices • Promote the experiential and decentral use of mobile IT	• Consider individuals' needs and desires in policies on IT selection • Deliver individual training contents that reach into the personal spheres of employees
Stress and overload	• Assess current levels of stress induced by technology • Create opportunities for non-virtual interactions	• Involve users in IS decisions • Keep policies flexible so that user find out their best way to use IT • Provide soft skill training to increase technological literacy	• Acknowledge that workers have different stress perceptions resulting from work with IT • Develop individual rather than universal strategies to reduce stress and overload from IT

Maintain organizational control

Most apparent in studies about compliance, organizations ought to maintain control over behaviors with user-liberating technologies in the digital workplace. In particular for safety-critical business sectors, it is important and sometimes prescribed by law not to lose control (Harris et al. 2012). But control has more facets than security. It means that organizations are aware whether their knowledge workers perform work tasks with high productivity (e.g., Cameron and Webster 2013) and without overstraining themselves (e.g., Galluch et al. 2015).

An important concept in this regard throughout all research topics was monitoring user behaviors. Many studies argue that an assessment of the problem size is crucial before thinking about countermeasures. At the same time, the studies have developed measurement constructs that can be used as diagnostic tools, i.e., the measurement items can be part of employee surveys (Ayyagari and Grover 2011; Tarafdar, Tu, Ragu-Nathan, and Ragu-Nathan 2007). The practical feasibility of such approaches will, however, depend on the context. By analyzing productivity or stress levels, end user monitoring enters a sensitive area in terms of surveillance and privacy (Leclercq et al. 2014). Since none of the analyzed studies addresses this point in more details, future work may develop solutions with enhanced practical feasibility that both satisfy monitoring demands but also legitimate concerns of end users.

Based on the assessment of the problem size, organizations are able to develop organizational norms that are supported by clear IT policies. Those guidelines should address security aspects, such as questions like "where can I store my work data?", or "can I use my private laptop?". Second, the guidelines should underscore digital work norms, first because they will simplify digital collaboration and communication and second, because many studies have shown that people are not able to fully cope with technology-induced stress by themselves. Hence, guidelines should assist employees with answering questions like "when do I have to be reachable by smartphone?" or "what messages have high priority and how do I label an urgent message?". D'Arcy et al. (2014) show a list of statements that information security policies should contain. The lists provided by Hemp (2009) as well as Cross and Gray (2013) may be a good starting point for defining behavioral practices to reduce collaboration and communication overload.

In a more subtle sense, organizations can also maintain control, if they make sure that employees possess necessary critical skills in relation to technology use. Thus, when providing user training, it is important that participants really understand the needs of the organization in addition to the teaching of pure contents. For instance, employees should internalize bad outcomes of their behaviors for the organization (Siponen and Vance 2010), and fully understand why certain technologies are implemented (Tarafdar et al. 2015). This may also include ethical training to reinforce employee beliefs about behavioral standards (Bulgurcu et al. 2010; Li et al. 2014). Good advice on this can be gathered from Guo et al. (2011), Siponen and Vance (2010), as well as Puhakainen and Siponen (2010) who provide detailed suggestions for training programs in order to ensure compliant technology use.

Foster user autonomy

Enabled by the increased IT competence beyond the IS department (Davis 2013), it is widely argued that the digital workplace of the future will be characterized by increased user autonomy. Consumer-oriented technologies, such as smartphones are easy to use and allow employees to be empowered about which applications to use for work and how to use IT for work (Harris et al. 2012; Tarafdar et al. 2014).

However, in stark contrast to the increased IT competence level of the workforce, "provide support and training for users" was by far the most recommended concept in research on the digital workplace. In other words, it seems that the new workforce generation, although claimed to be inherently tech-savvy (Davis 2013), has not reduced the demand for vocational training yet. Most studies target their training recommendation towards knowledge workers. Only few studies argue for lower training necessity. For instance, Tarafdar et al. (2014) suggest that continuous ongoing support is more effective than one-time trainings for employees in order to avoid negative outcomes of technology use.

While some studies still advice rather standardized technical training to leverage technological features (e.g., Dery and MacCormick 2012; Tarafdar et al. 2015), a shift can be noted towards broader topics in order to enable users to exert technological autonomy. For instance, end users need to understand how

the use of certain technologies affects their individual job performance (Guo et al. 2011). In addition, they should also be trained after a certain device or application has been initially appropriated (Fuller and Dennis 2009). In this sense, many scholars recommend an improved exchange about IS use behaviors between individuals and teams (e.g., Mulki et al. 2009; Tarafdar et al. 2014).

Considering the increased importance of information technology in people's lifestyles, many users acquire technology skills in the private realm and offer to volunteer their competence to the organization (Davis 2013). As this may create intensified boundary blurring between work and private lives (Sarker et al. 2012), scholars also recommended training concepts that lie rather outside the scope of the organizations' daily business and reach into the personal sphere of employees, for example, managing life styles (Ahuja et al. 2007), or how to be creative with technology (Fuller and Dennis 2009).

Furthermore, it is noticeable in the scholar's recommendations that a more empowered workforce requires changes in the leadership culture of an organization. Thus, it is the task of managers to promote an organizational climate that supports decentralized and self-responsible use of information assets. For this, many leaders are likely required to develop new skills, resulting in training recommendations for supervisors, who have a prominent position in digital workflows. For instance, supervisors need to acquire social media skills and help building communities (Huy and Shipilov 2012)

At the same time, managers must ensure not to overwhelm their staff with responsibilities. Mazmanian et al. (2013) observed that knowledge workers sometimes deliberately restrict their autonomy by being connected to work through their mobile devices all around the clock, leading to increased stress levels. Managers should think of helping people to better handle their daily work demands (Hemp 2009). For example, managers can think about when exactly to send out messages and tasks to their employees in order to avoid detrimental effects (Li et al. 2011).

Develop individual workplace designs

Throughout the four research topics, "one-size does not fit all" is an often-cited catchphrase in the practitioner recommendations on the digital workplace (Maruping and Magni 2015; Mayer et al. 2012; Srivastava et al. 2015; Tarafdar et al. 2014). It means that approaches that treat all employees equally are inadequate to address current challenges of the digital workplace. Thus, researchers call for individual solutions that better target people's preferences, job roles, and work behaviors.

First, people's preferences may differ in terms of the selection of IT hardware and software tools. The classical discrepancy between iOS and Android users is just the beginning and comparatively easy manageable. More specifically, people also differ in how often and when they use IT to communicate with others. For instance, Sarker et al. (2012) note that employees face problems when they work with colleagues that have different preferences on work-life balance. It is recommended by the academic studies to acknowledge that such differences exist. In some cases, defining norms when to be available for work-related calls and when not might be sufficient to bring employees back together. However, certain user preferences will not fit to certain job roles, i.e. assignments must be taken with care – or even considered when hiring new staff. As an example for a worker segmentation by job roles, van Heck et al. (2012) have developed seven personas with a specific digital work style.

Second, work behaviors may depend on people's individual characteristic traits. For instance, literature notes that people with particular personality types are more susceptible to policy violations (e.g., D'Arcy et al. 2014). Thus, the effect of formal sanctions is likely to have different effects depending on personal moral values (Li et al. 2014). Consequently, "one-size does not fit all" is also valid for providing end user training about norms and guidelines. Scholars demand training contents to be more personalized towards the specific characteristics, needs, and job roles of knowledge workers (Dery and MacCormick 2012). For instance, training concepts should consider previous knowledge and work circumstances (Puhakainen and Siponen 2010). Ideally, the training is targeted with relevance to the individual workplace.

Third, people's willingness to actively participate in collaborative work forms, such as blogs, wikis, or podcasts, might depend on their level of openness and extraversion. Here, a promising strategy to design individual workplace designs might be to focus on the extremes, i.e., make special effort to identify and assist employees that have only few collaborative ties (Cross and Gray 2013; Zhang and Venkatesh 2013)

to avoid their potential isolation (Koch, Gonzalez, and Leidner 2012). Similarly, employees and managers with too many ties can be reminded to combat against their obvious communication overload, for example, by reducing the number of attended meetings or received emails.

Concluding comments

This study aims to identify research implications on the digital workplace of the future. For this purpose, a screening of academic-practitioner literature was conducted, followed by a systematic review of academic top journal literature. The screening revealed four main research topics on the digital workplace that are reported in academic-practitioner literature: 1) Collaboration, 2) Compliance, 3) Mobility, and 4) Stress and overload. In total, the systematic review identified 79 relevant publications, whose practical implications on the digital workplace could be categorized into 15 concepts. The implications provide a solid basis for managers to get informed about potential strategies for designing the digital workplace of the future. Interestingly, many concepts seem to be relevant for the digital workplace as a whole beyond the specific research context they were investigated in.

Limitations

First, this literature review was limited on a particular selection of top journals. Although this is arguably appropriate for the aim of this research, a future study may extend the search frame towards more journals and conference publications. Second, even in the final list of identified articles, useful implications for practice may not have been considered if they were not specifically depicted within the articles. For instance, implications for practice may not necessarily be mentioned in a dedicated section using explicit phrases, but also from other parts of the articles.

It is noticeable that a number of implications for practice are formulated superficial and thus complicate their transfer to practice. For example, van Heck et al. (2012) recommend that "organizations should set clear output goals and metrics … for productivity" (p. 187). Similarly Stieglitz and Brockmann (2012) request "enterprise-specific key performance indicators to measure the success of mobile services" (p. 202). First, this is probably a good procedure for any change project and not specific to the digital workplace. Second, the recommendation directly leads to follow-up questions, such as "Which goals?", "Which metrics?", and "How to measure the metrics?" Given our selection of studies, there were no concrete recommendations regarding this point. However, together with the numerous quotes and references to the academic body of knowledge, the list of aggregated concepts is valuable for practitioners and offers plenty of opportunities for further reading.

On a more general note, the identified studies almost unanimously request organizations to take action, thus being an active promoter of the digital workplace of the future. Managers are required to create more awareness, more support, more training and know-how, more control structures, and more opportunities for empowerment etc. In this sense, Kietzmann et al. (2013) rightfully raise the question what these "more" means in terms of resources such as time, money, facilities, and technology. Studies that investigate this rather financial perspective, i.e. cost-benefit evaluation on technology-related workplace investments, could not be identified in this review. As these calculations are rather context-dependent, the investigation of longitudinal case studies could be an appropriate research method for this endeavor.

Implications and outlook

Overlooking the limitations, some of the recommendations identified in this study may have a rather limited practical feasibility for many organizations. Thus, an actual implementation is complicated and will depend on the context of application. To be of greater value for practitioners, future studies could take one of the following directions.

It is apparent that many studies investigate outcomes of workplace technologies in a rather unilateral fashion. While studies on mobility and collaboration naturally rather focus on positive outcomes such as

productivity and flexibility gains, studies on compliance, stress, and overload put emphasis on negative outcomes. Few studies juxtapose positive and negative effects of technology in the digital workplace. More specifically, while many studies discuss potential influence factors like individual characteristics or the workplace environment, few studies can give sound advice when certain technology-related behavior will turn out to be positive or negative for an individual and the organization.

The development of individual design approaches to better target worker preferences and job role requirements is reminiscent to the long-standing discussions in the IS literature on individual differences (Agarwal and Prasad 1999; Harrison and Kelly Rainer 1992) and task-technology fit (Goodhue and Thompson 1995). However, user's IT know-how and expectations towards enterprise IT have increased considerably since then. In the private realm, an individualization of IT has become a prevailing practice and affects more and more people's workspaces (Baskerville 2011; Ortbach, Köffer, Bode, and Niehaves 2013). This will require researchers and organizations to expand their thinking beyond the company walls and constantly be aware of developments on the consumer market. In many cases, consumer-oriented styles in the digital workplace will be rather a necessity than "nice to have".

As regards technological design, Tarafdar et al. (2014) suggest that managers should deviate from traditionally preferred technical approaches and act beyond technical tools helping their employees to use IT. Most of the posed implications for practice in this study are indeed of rather managerial nature. Only few recommendations focus on technological design. One exception is the study by Cousins and Varshney (2009) who provide a list of guidelines for system designers of next-generation ubiquitous technologies in the workplace. While the lack of technical recommendations may also be related to the general shortage of design science publications in top journal outlets (Goes 2014), the question remains in how far better designed systems can address challenges of the digital workplace. For instance, there is relatively little insight what new data sources (e.g., mobile devices) could be sensed to help knowledge workers in doing their jobs – or how systems should consider individual differences or distinct job roles.

Finally, this study contributes to the discussion on relevance of IS research. First, the results can serve as condensed knowledge base for further interaction with practitioners, for instance, in form of applicability checks (Rosemann and Vessey 2008). Second, while there are obvious differences between the four research topics, many recommendations from academic literature were extracted beyond from what can be found in popular academic-practitioner literature. However, this should not be interpreted as an argument that practitioners should read more scholarly articles. Instead, researchers may hopefully be inspired by this study to continue their effort to share their relevant findings outside the scholarly community to ensure wide knowledge transfer to organizations and society.

Acknowledgments

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Appendix: Methodology

In order to identify related research topics on the digital workplace, the review started with a screening of academic-practitioner literature. Table A1 summarizes the 18 publications that provided answers to the research question, i.e. the articles dealt with digital tools and applications in the workplace. The categorization of the articles into key concepts was conducted in a group effort. Thus, both in the process of grouping implications into meaningful concepts and for the derivation of initial research topics, multiple researchers were involved to increase the meaningfulness of the emerging topics and concepts. At the end of the process, all publications were assigned to one or two of the four research topics: 1) collaboration (COL), 2) compliance (COM), 3) mobility (MOB), and 4) stress and overload (SO).

Table A1. Mapping of identified literature in practitioner journals with key concepts				
Article	**COL**	**COM**	**MOB**	**SO**
Andriole (2010) *	X			
Cousins and Varshney (2009) *			X	X
Cross and Gray (2013)	X			X
Dery and MacCormick (2012)			X	X
Groysberg and Abrahams (2014) *				X
Harris, Ives, and Junglas (2012)		X	X	
Hemp (2009)				X
Huy and Shipilov (2012)	X			
Kane (2015)	X			
Mayer, Bischoff, Winter, and Weitzel (2012)			X	
McAfee (2006)	X			
Mulki, Bardhi, Lassk, and Nanavaty-Dahl (2009)			X	X
Perlow and Porter (2009) *				X
Sarker, Xiao, Sarker, and Ahuja (2012)			X	X
Stieglitz and Brockmann (2012)			X	
Tarafdar, Tu, Ragu-Nathan, and Ragu-Nathan (2011)				X
Tarafdar, D'Arcy, Turel, and Gupta (2014)		X		X
van Heck, van Baalen, van der Meulen, and van Oosterhout (2012)			X	
Sum	5	2	8	10

* This publication did not provide any or only indirect implications for practice that were not included in the results

The structured literature review began with an initial keyword search using the search terms "workplace", "workspace", "at work", including plural and other close synonyms. Explicit search terms that resemble the key concepts were not used as initial keywords in order not to produce too many candidate articles that do not focus the digital workplace, but rather on the technology itself or there outcomes beyond the workplace. The search was restricted on the AIS Senior Scholars' Basket of Journals (Aisnet.org 2011). These journals are considered the leading mainstream journals in the IS field and are characterized by their global reach and reputation (Sarker, Xiao, and Beaulieu 2013). Furthermore, a recent bibliometric analysis by Lowry et al. (2013) confirmed the outstanding position of the journals in the Scholars' Basket. Acknowledging the rather high number of related conference articles and lower-rank journal publications, the restrictions of using "A-journals" is arguably a reasonable choice (Rowe 2014).

The IT workplace of the future is an interdisciplinary topic, meaning restricting the scope to solely IS journals is invalid. Thus, a number of non-IS journals from related areas were selected. Those journals were chosen due to their evaluations from international scholars (Dean and Lowry 2011; German Academic Association for Business Research 2015; Willcocks, Whitley, and Avgerou 2008). The selection included Academy of Management Journal, Academy of Management Review, Administrative Science Quarterly, Organization Science, Strategic Management Journal, and Management Science.

To be in the result set, a journal publication had to mention at least one of the search terms either in the title, abstract, or keywords. Articles that used the search terms in a different context were directly excluded. The initial keyword search revealed a number of 61 candidate publications. The remaining articles were analyzed in detail, 32 of which were excluded since their focus was not on the digital workplace. Thereby, it must be noted that many of the excluded articles were still related to IT use at the workplace, but did not provide insights to address the research question. More specifically, their focus was not on the deployment of technological tools and applications in the workplace.

For example, articles were excluded that

- focused solely on the implementation of a specific technology (e.g. video conferencing) at work without any transferability to other technologies,
- focused on deliberate or abusive behaviors of employees (e.g. computer abuse),
- focused on individual technology adoption, not specific to the workplace,
- focused solely on a specific domain (e.g., healthcare),
- or did not match the research topics identified in the screening of academic-practitioner outlets, such as collaboration, compliance, mobility, and stress and overload.

The search was then completed by conducting a backward and forward search (Webster and Watson 2002) with two iterations in the Web of Science. This procedure led to the additional selection of 32 articles. Together with the 18 articles identified in the screening of academic-practitioner literature, the final result set comprised 79 articles. From this result set, 27 of the articles did not provide any concrete implications for practice because they were rather theoretical pieces or research editorials. All articles and their assignment to the four research topics are listed in Table A2.

Table A2. Mapping of identified literature in academic journals with key concepts				
Article	**COL**	**COM**	**MOB**	**SO**
Ahuja, Chudoba, Kacmar, McKnight, and George (2007)			X	X
Ayyagari and Grover (2011)				X
Barley, Meyerson, and Grodal (2011) *	X			
Boss, Kirsch, Angermeier, Shingler, and Boss (2009)		X		
Bulgurcu, Cavusoglu, and Benbasat (2010)		X		
Cameron and Webster (2011)	X			
Cameron and Webster (2013)	X			X
Chen, Ramamurthy, and Wen (2012)		X		
D'Arcy, Herath, and Shoss (2014)		X		
Davis (2013)	X			
Dery, Kolb, and MacCormick (2014) *			X	X
Elie-Dit-Cosaque, Pallud, and Kalika (2011)				X
Ferneley and Sobreperez (2006) *		X		
Fuller and Dennis (2009)	X			
Galluch, Grover, and Thatcher (2015)				X
Gray, Parise, and Iyer (2011)	X			
Greenhill and Wilson (2006)				X
Guo, Yuan, Archer, and Connelly (2011)		X		
Herath and Rao (2009)		X		
Hsu, Shih, Hung, and Lowry (2015)		X		
Kietzmann et al. (2013)	X		X	
Koch, Gonzalez, and Leidner (2012)	X			X
Koch, Leidner, and Gonzalez (2013)	X			
Kügler, Smolnik, and Kane (2015)	X			

Leclercq, Isaac, and Kalika (2014)		X	X	
Li, Gupta, Luo, and Warkentin (2011)	X			X
Li, Sarathy, Zhang, and Luo (2014)		X		
Liang, Xue, and Wu (2013)		X		
Lowry and Moody (2015) *		X		
Magni, Angst, and Agarwal (2012)	X			
Maruping and Magni (2012)	X			
Maruping and Magni (2015)	X			
Mazmanian, Orlikowski, and Yates (2013) *			X	
Middleton and Cukier (2006) *	X		X	
Middleton, Scheepers, and Tuunainen (2014) *				
Myyry, Siponen, Pahnila, Vartiainen, and Vance (2009)		X		
O'Leary and Cummings (2007) *	X			
Prasopoulou, Pouloudi, and Panteli (2006)			X	X
Puhakainen and Siponen (2010)		X		
Ragu-Nathan, Tarafdar, Ragu-Nathan, and Tu (2008)				X
Reyt and Wiesenfeld (2015)			X	
Schweitzer and Duxbury (2010) *				
Siponen and Vance (2010)		X		
Srivastava, Chandra, and Shirish (2015)				X
Tarafdar, Tu, Ragu-Nathan, and Ragu-Nathan (2007) **				X
Tarafdar, Tu, and Ragu-Nathan (2010)				X
Tarafdar, Pullins, and Ragu-Nathan (2015)				X
Wakefield and Whitten (2006)			X	
Wang and Haggerty (2011)	X			
Wattal, Racherla, and Mandviwalla (2010) *	X			
Zhang and Venkatesh (2013)	X			
Sum	19	15	9	15

* This publication did not provide any or only indirect implications for practice that were not included in the results,
** An practice-oriented version of this study was published in Tarafdar et al. (2011)