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Special Issue Editorial

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Editors' Comments

Special Issue Editorial: New Approaches to Optimizing the Digital Workplace

Editorial

This December 2018 Special Issue is dedicated to one of the consistently most pressing issues facing IT leaders: optimizing an increasingly digital and diverse IT workforce. This includes the full spectrum of managerial issues: reframing whom the IT worker is, tapping new sources of IT talent, identifying quality IT workers, retaining IT workers, and managing digital transformation throughout organizations.

Challenges for the Future to be Addressed Now

This issue explores not just the past, but ongoing challenges and opportunities presented by the changing digital workforce.

Whereas in the past, we debated definitions, skills, and composition of the IT workforce[2,6,9] we now must consider a future inhabited by a diversely skilled, global, temporary, and often-virtual workforce, customer base, and society that is intertwined with mixed-reality, artificial intelligence (AI), robotics, and drones as co-workers.[1] The PwC 2016 report on IT Leadership Issues includes "IT talent management" as among their top ten[2], with the 2017 SIM IT Issues and Trends Study listing it among the top three most worrisome issues for IT leaders.[3] Human capital management in today's organizations is challenged by evolving recruiting and digital talent metrics, dissimilar expectations of an increasingly multi-generational, multi-cultural labor force, continued gender inequality, increased goals for social inclusion, and the aging out of knowledge workers in many economic sectors.[4,5,6,7,8]

Globally, the numbers and complexity of managing the IT workforce will continue to grow, for instance, in the USA alone, it is expected that cumulative growth in computing and IT jobs will outpace other occupations, embracing new digital technologies, and workforce models.

Employment of computer and information technology occupations is projected to grow 12 percent from 2014 to 2024, faster than the average for all occupations. These occupations are expected to add about 488,500 new jobs, from about 3.9 million jobs to about 4.4 million jobs from 2014 to 2024, in part due to a greater emphasis on cloud computing, the collection and storage of big data, more everyday items becoming connected to the Internet in what is commonly referred to as the "Internet of things," and the continued demand for mobile computing. (Occupational Outlook Handbook, US Bureau of Labor Statistics, Dec. 2015) [9]

To add to the complexity of optimizing the traditional IT workforce, the digital workforce includes millions of knowledge workers and customers performing IT development work or co-creating products and services. These individuals may or not qualify as included in

1 See Lacity, M. & Willcocks, L. "Robotic Process Automation at Telefónica O2," *MIS Quarterly Executive*, March 2016, 15(1).

2 PwC, (2017) Global Digital IQ® Accessed Feb. 16, 2017 at http://www.pwc.com/us/en/advisory-services/digital-iq.html?icid=pwcus_home-new_hero_Advisory_Digital-IQ

3 Kappleman, L., Johnson, V., Maurer, C., McLean, E., Torres, R., and Nguyen, Q. "The 2017 SIM IT Issues and Trends Study," *MIS Quarterly Executive*, March 2018, 17(1).

4 Quesenberry, J.L. and Trauth, E.T. "Working Where She Wants and Wanting Where She Works: Understanding Career Values and Motivations of Women in the IT Workforce," *Information Systems Journal,* (22), 2012, 457-473.

5 Trauth, E.M., Quesenberry, J.L, and Huang, H. "Retaining Women in the American IT Workforce: Theorizing the Influence of Organizational Factors," *European Journal on Information Systems*, Special Issue on Meeting the Renewed Demand for IT Workers, 2009, 18, 476-497

6 Bersin, J., Houston, J., and Kester, B. "Talent analytics in practice: Go from talking to delivering on big data," Deloitte Human Capital Trends Report 2014. *Deloitte University Press*. Accessed Feb 28, 2017 at https://dupress.deloitte.com/dup-us-en/focus/human-capital-trends/2014/hc-trends-2014-talent-analytics.html?id=gx:el:dc:dup684:cons:awa:hct14

7 Merisotis, J. "Appreciating a multigenerational higher education IT workforce," *EDUCAUSE Review*, 2016, 51(3), 39.

8 Toosi, Mitra. "Labor force projections to 2022: the labor force participation rate continues to fall," *Monthly Labor Review*. US Bureau of Labor Statistics. December 2013. Accessed Feb 28, 2017 at https://www.bls.gov/opub/mlr/2013/article/labor-force-projections-to-2022-the-labor-force-participation-rate-continues-to-fall.htm

9 BLS Occupational Outlook Handbook (2015) Computer and Information Technology Occupations. US Bureau of Labor Statistics. Published Thursday, December 17, 2015 Accessed Feb 28, 2017 at https://www.bls.gov/ooh/computer-and-information-technology/home.htm

existing definitions of the IT workforce.[10,11] These include crowdsourced workers and the growing 'GIG" economy of workers who chose to take shorter-term contracts to maximize their flexibility, job variety, or to provide access to work that would otherwise not be available. We are also seeing the "do-overs", workers who decide to change things up, seeking new challenges, and pursuing new opportunities presented by digital work.[12] The old challenges of recruiting, motivating, developing, and retaining skilled workers both inside and outside the formal IT function continue, but are shifting in their co-evolution with IT.[13,14]

At the global level, the World Economic Forum (WEF) has as one of its many focal areas "Shaping the Future of Education, Gender, and Work".[15] They ask, *"How can talent be developed and deployed to ensure that more than 7 billion people can fulfill their potential?"* Their 2017 report highlights three global challenges facing organizations and society in developing and deploying human capital:

1. *Globalization and technology are accelerating job creation and destruction, with estimates that a third of skillsets required to perform jobs will be wholly new by 2020.*
2. *Education and training systems, having remained largely static for decades, are not keeping pace with these shifts… Some studies suggest that 65% of children entering primary school today will have jobs that do not yet exist and for which their education will fail to prepare them, exacerbating skills gaps and unemployment in the future workforce.*
3. *Outdated cultural norms and institutional inertia create roadblocks for half of the world's talent. These factors together exacerbate income inequality and fuel political and social turmoil… According to the latest data, on average globally, women have less than two-thirds of the economic opportunity that men have, and the rate of progress is stalling, with current forecasts to economic parity at 170 years.*

The WEF is not alone in highlighting the importance of developing and managing human capital in the twenty-first century. PwC's survey of 2,216 business and technology executives found that organizations with more comprehensive digital strategies achieved stronger financial performance.[16] Digital strategies extend beyond managing technology development and execution to include managing relationships between employees, customers, and the digital environment they co-habit. In reporting on the perceived "Digital IQ" of surveyed firms, "82% of top-performing companies emphasize the human experience surrounding digital tech". [17]

More than the user experience, the complex interaction of humans and digital artifacts requires attention to new skills and work relationships. From the bottom up, as employees and customers adopt emerging social media technologies and special purpose applications (referred to as IT consumerism)[18] , the resulting IT complexity, security, and privacy issues force organizations to reconsider new work routines, enterprise tools, and human capital development opportunities.[19,20]

Our objective in this special issue is to examine strategic business opportunities and challenges associated with managing a diverse and evolving digital workforce. The articles presented in

10 Kaarst-Brown, M.L. & Guzman, I. "Who is the IT Workforce? Challenges Facing Policy Makers, Management, and Research," *Proceedings of 2005 ACM SIGMIS CPR - Computer Personnel Research Conference*, 1-8. Atlanta, GA.

11 Niederman, F., Ferratt, T. & Trauth, E. M. "On the Co-Evolution of Information Technology and Information Systems Personnel," *The Data Base for Advances in Information Systems*, 47(1), 2016, 29-50.

12 Deng, X. & Joshi, K. D. "Why individuals participate in micro-task crowdsourcing work environment: Revealing crowdworkers' perceptions," *Journal of the Association for Information Systems*, 2016, 17(10), 648-673.

13 Niederman, Ferratt, and Trauth. Op. Cit. 2016.

14 Weitzel, T., Eckhardt, A., and Laumer, S. "A Framework for Recruiting IT Talent: Lessons from Siemens". *MIS Quarterly Executive*, December 2009, 8(4), 175-189.

15 WEF "Realizing Human Potential in the Fourth Industrial Revolution," 2017 Report from *World Economic Forum*. Accessed Feb 28, 2017 at https://www.weforum.org/whitepapers/realizing-human-potential-in-the-fourth-industrial-revolution

16 PWC. Op. cit. (2017)

17 Ibid.

18 Harris, J., Ives, B. & Junglas, I. "IT Consumerization: When Gadgets Turn Into Enterprise IT Tools". *MIS Quarterly Executive*, September 2012, 11(3).

19 Ibid.

20 Tripp, J. F., Riemenschneider, C., & Thatcher, J. B. Job satisfaction in agile development teams: Agile development as work redesign," *Journal of the Association for Information Systems*, 2016, 17(4), 267-307.

this issue and in the next (*MISQE*, 2019, Vol 18, Issue 1) present six examples of emerging and innovative approaches to addressing the above.

Six Perspectives for IT Leaders on Optimizing the Digital Workforce

The six articles included in this special issue cover the spectrum of IT workforce issues – but with a twist.

The first article by **Eleanor Loiacono** and **Huimin Ren** (this issue) addresses why we need to reframe the characteristics of the IT workforce, arguing for why diversity needs to expand its definition to include "neurodiversity". They explain that neurodiversity is *"the variation and differences in neurological structure and function that exist among human beings, especially when viewed as being normal and natural rather than pathological [i.e., disability or impairment]."*[21] Given that organizations report shortages of skilled IT workers across the board, and particularly in specialty areas, efforts to broaden the baseline of individuals eligible for such work stands to reason. Loiacono and Ren examine the area of neurodiversity, explaining that the number of individuals exhibiting a variety of conditions continues to grow. This variation among the population of workers presents an opportunity that benefits diversity in the workforce. They share insights from leaders at two organizations with successful programs that acknowledge the value of neurodiverse individuals. In order to integrate this neurodiverse workforce, the authors suggest a programmatic approach to recruitment, advocacy, accommodations, and managerial support. Toward the goal of expanding the range of successful workers, the authors advocate: (1) creating an executive sponsor for creating the neurodiverse workforce; (2) reorganizing hiring and selection processes to screen in promising candidates; (3) providing appropriate education and training; (4) creating an open communication regarding neurodiversity; and (5) considering the societal contribution of helping a challenged subset of the population toward meaningful contribution. Loiacono and Ren challenge us to open our thinking on the diverse characteristics of the IT workforce. They also provide guidance and resources to help us do this.

Access to the IT workforce is shifting as we see more workers opt for more control over their work life balance or seek a more balanced pace in their work-life arrangements. This so-called GIG economy is encouraging a number of emerging alternative arrangements that IS managers can consider for generating computing results. One of these approaches is *IT Crowdsourcing.* **Joseph Taylor** and **K.D. Joshi** (this issue) bring us a unique voice – that of the IT crowdsourced worker. Using vignettes to share experiences and lessons learned, this viewpoint helps IT and HR managers better understand where and when (for what type of tasks) crowdsourcing provides advantageous outcomes. They also share methods for extracting these benefits and for blending this tactic with other IS staffing approaches. This article probes a particular type of crowdsourcing where a neutral platform acts as an intermediary for clients and providers. They explain the process where the client posts a job, potential providers provide bids, the client posts funds to an escrow account, and funding is released as the job is completed. Both client and provider have the opportunity to rate one another. Advantages of such relationships include attracting employees to the workforce who would otherwise be unavailable. The authors share the employees' perspective of why they are viewed by clients as adding value by providing clients with "on demand" access to specialized skills and labor without the commitment of long term arrangements. The authors summarize options and opportunities for firms to adjust their work processing systems to take full advantage of this source of labor.

Although formal education and training are an excellent source of skill development for IT workers, additional routes exist for gaining skills and experience. **Stacie Petter, Connie Barber, Diane Barber**, and **Robyn Berkley** (this issue) propose that potential employers of IT workers consider the array of skills derived from on-line gaming, particularly when the IT labor market grows tight. Skills identified as being developed or enhanced through on-line gaming include leadership, communication, decisiveness, and collaboration. Not all games are created equally

21 http://www.dictionary.com/browse/neurodiversity. Accessed Oct 5, 2018.

and this insightful article distinguishes among different game types, suggesting which skills accrue for each type. The article acknowledges problematic societal issues sometimes associated with on-line gaming. Additionally the authors suggest how to prepare the organization, recruit talent, and select candidates with game derived skills as one input into the process. This article also presents experience-based interview questions that IT recruiters can use to elicit information about job candidates about learning accrued from gaming experience. Petter et al. go beyond asking us to face our biases about online gaming by providing new techniques and insights for IT leaders and HR managers.

The challenge of retaining key IT workers has been a source of difficulty for many firms since the introduction of computers in the mid-1900s. However, much of the work regarding retention has treated IT workers (or workers even more broadly) as a single homogenous group. **Christoph Pflugler**, **Nico Becker**, **Manuel Wiesche**, and **Helmut Krcmar** (this issue) take a different approach by differentiating IT worker types based on careful examination of different circumstances and challenges that lead IT employees to leave the firm. They list seven turnover types ranging from those whose jobs and skills/interests are not tightly matched, through to employees who just need something new. Their approach represents a different and pragmatic perspective on what has been a heavily researched topic in human resource and IT management. What is unique and helpful in this study is showing the correspondence between worker types with particular sets of interventions. These interventions go beyond compensation, and include suggestions for new work arrangements, career development, relationship management, and learning opportunities. The authors are realistic in understanding that many firms will not have the resources to provide all interventions for all workers and may not be able to differentiate workers precisely into types. Nonetheless, these guidelines and insights provide a basis for firms to customize their own policies, resources, and actions to improve retention outcomes.

Successful digital transformation includes a transformation of information systems, business processes, and the entire workforce. While each of these present substantial challenges, **Rebekah Eden**, **Andrew Burton-Jones**, **Veronica Casey**, and **Michael Draheim** (next issue) show how digital transformation and workforce transformation are intertwined and that culture and transparency can be the glue that keeps a transforming organization together. They reveal what interventions and practices facilitated this dual transformation at a large health service transformation in Australia. They suggest that three practices – flexing, deepening, and revitalizing – helped overcome the significant challenges involved, and made possible a successful digital and workforce transformation. The success of the transformation rests on long-term cultural transformation, a clear data governance structure, collaborative visioning, and building capabilities for dealing with change-as-usual. They challenge us to see that system implementation is not an end-goal, but an enabler of change.

The potential benefits of virtual work by virtual teams are clear. Employee knowledge and skills can be combined from throughout the global reach of an organization for customized group work to solve otherwise intractable problems. However, realizing such benefits entails creating systems – both technical and procedural – to overcome communication barriers and facilitate smooth virtual team functioning. **Andreas Eckhardt**, **Anthony Giordano**, **Florian Endter**, and **Paul Somers** (next issue) propose an actionable framework, the Virtual Work Stage Model, to help executives benefit from and optimize the work of virtual employees in their organization. To set the stage, the authors focus on three areas of preparation for building a virtual workforce: the mental employee considerations, the required technical solutions, and the relational environment needed for coordination and collaboration. The Virtual Work Stage Model was developed through experience-based interviews with managers at two leading technology companies: Trello and Buffer. The authors build on these industry experiences and prescribe a three-stage approach to going virtual that includes preparation, and finally virtualization. The authors are pragmatic and offer several critical lessons learned that executives might consider when applying the model. Many of these considerations stand in

contrast to what common practice might suggest, particularly with regard to social expectations and trust building.

Looking Forward – The Guest Editors Reflect

Michelle's Thoughts

When asked to lead the *MISQE* December 2018 Special Issue, I was excited even as I faced two huge decisions: first, what would be the topic given all the exciting changes we see around us, and second, who to invite to join my Guest Editor Team. The journal has published many excellent articles on IT management or governance issues, and around digital transformation. I felt that there was an opportunity, however, to focus on the future changes for work and workers. I termed this *Optimizing the Digital Workforce*, and while optimizing can be interpreted from an efficiency perspective, I view it as expressing the full range of enhancing, augmenting, boosting, elevating, and raising up. My definition of the digital workforce includes those within IT and those outside IT. My personal goal was to enable a shift in thinking to looking ahead. I hoped that potential authors would present us with innovative and entrepreneurial initiatives to provide guidance for IT leaders as we move into the future. More than exemplary research, I hoped we would be able to publish exciting stories from different perspectives.

The second decision on Guest Editor Team composition was in some ways more challenging because of the exceptional researchers working in this intellectual space. My work with AIS, *MISQE*, the Society for Information Management (SIM), and the ACM SIGMIS-Computer and People Research (CPR) communities provided me with many wonderful academic leaders to consider. The journal was triply blessed that Fred Niederman, Jeria Quesenberry, and Tim Weitzel all agreed to join me in guiding this special issue. Their different perspectives made our discussions over the past twenty-two months intellectually stimulating. Their thoughtful insights on various workshop abstracts and full manuscripts meant that submitting authors received exemplary feedback and guidance that resulted in the six accepted articles. Through two workshops and a two-day track at SIM Connect Live in Dallas in April 2018, authors worked with us, with other leading academics, and a diverse range of IT executives to hone their manuscripts to achieve that goal. We are all indebted to the insights of the, discussants at workshops/conferences, and reviewers of manuscripts who participated. The outcome is that the authors included in this special issue share both valuable examples and raise provocative questions.

As you will read, collectively, we all bring our experiences, particular research interests, and curiosity to this special issue. This section is to allow each of the guest editors to share our voice. We each have different, but sometimes overlapping, thoughts about what the future holds for optimizing the digital workforce.

My views are driven by the three intersecting streams of my IT research: culture, the IT workforce, and risk and opportunity management. While these three areas are ongoing IT governance concerns, they are also major *societal concerns*. As mentioned in the opening, the World Economic Forum (WEF) has several initiatives that focus on global technological and societal change. One such initiative is *Shaping the Future of Digital Economy and Society.* They ask, *"How can we build a sustainable, inclusive, and trustworthy digital future?"* The WEF expands this into six goals: (1) Access and adoption by all people, (2) Responsible digital transformation, (3) Fit for purpose with informed governance, (4) Secure and resilient people, (5) User-centric, interoperable digital identities, and (6) Trustworthy data integration. [22]

Organizations presented in this issue are on the leading edge, still learning, and still facing new challenges as they move into the future to achieve these goals. Looking forward from the challenges and lessons presented in the special issue articles, I gravitate toward three themes that provide insights for IT leaders to help them be part of this evolution.

1. IT and business strategy alignment extends into social alignment (Taylor and Joshi; Loiacono and Ren; this issue)

22 *WEF*, "Initiatives: Shaping the Future of the Digital Economy and Society," Accessed Sept. 15, 2018 at https://www.weforum.org/system-initiatives/shaping-the-future-of-digital-economy-and-society

2. Equality increasingly will not mean identical treatment (Loiacono and Ren; Petter et al.; Pflugler et al; this issue)
3. Organizations must support a culture of worker resiliency and adaptability (Eden et al.; Eckhardt et al.; next issue)

The argument that IT needs to be aligned with business strategy is well into its third decade as a top issue for IT leaders – and both IT and business management still struggle to achieve it. This challenge is becoming greater as we see that firms need more than socially responsible investment – they need socially responsible digital strategy. Organizations of all types and in all sectors are challenged to embrace ethical and socially responsible IT management practices. In some countries, this is happening not just by choice, but also through institutional pressures such as legislation. Organizational and IT leaders continue to face shifting generational expectations of what a career entails, shifts in goals for work-life balance, and shifts throughout the employee's life and career from hiring to departure. These are not new challenges; however, shifts in technological capabilities are upping the game, requiring us to rethink both what we do, and how we do it. This will create new risks, even as it offers new opportunities. As one recent example, Google scrapped significant investment in an AI system that would ideally help them scan resumes. They discovered that machine algorithms could learn bias; the system was discriminating against female applicants.[23] As noted in several of the articles, however, even as we might seek to ban AI because of discrimination that has been copied/learned from the actual world, we still struggle with recruiters and practices that are embedded with implicit bias.

The second theme that stands out for me is that or goals of equality will not mean identical treatment, but varied treatment. Neither the status quo of current practices, one-size fits all policy, nor current definitions of who is the IT workforce will sustain us in the coming challenges. I was struck by a reviewer's comment that is echoed in Loiacono and Ren's findings that identifying a champion for the organizations' neurodiversity initiatives often engaged leaders who had family or friends who were neuro-atypical. Their motivation to lead these initiatives came from personal and social connection with the issues. For decades, we have struggled to create standardized and often identical treatment of workers in a goal of fairness and equity. The issue for the future, however, may be equality – that is, equivalence – rather than identical treatment. Firms work to achieve mass customization for customers and are now challenged to find similar flexibility for their workers.

As one example, a senior IT leader reviewed an early version of the Loiacono and Ren article and shared his reaction and the immediate impact on his leadership.

"As I read the recommendations, I began to survey mentally our IT team and my regular interactions with almost each contributor. I reflected on what might help the practitioner reader connect with the article and recommendations in discussion around their current workforce. I am confident that companies currently employ neurodiverse employees without identifying or categorizing them as neurodiverse. In my particular application, I gained an appreciation for a few of the examples of accommodations and recommendations, and will have discussions with my leaders next week. Let me provide a very specific example. We have recently redesigned our collaborative IT space by lowering the cubical walls, installing transparent separators between spaces, changing from rows of cubes to team spaces, etc. We have team members that are not thriving in that environment. Past discussions were focused on treating people equally and standardizing workspaces; however, this research provides evidence (and provokes thought) that our current approach may not always produce the intended result."

The third theme that struck me is that the organizations presented in these cases acknowledge the importance of supporting a culture of worker resiliency and adaptability to many types of change in the IT workforce and society. In light of increasing natural and weather related disasters, ongoing technology changes, and structural diversity of where we work and

23 See Dastin, J. (2018) "Amazon scraps secret AI recruiting tool that showed bias against women," *Reuters*, Business News. Oct 9, 2018. Accessed October 10, 2018 at https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G

with whom, being able to adapt successfully continues to be a key skill for survival. Individuals or firms that are complacent will be disadvantaged. Even as technology offers us the flexibility to work from our home, car, or the local coffee shop, or to tap those who wish to exploit this flexibility, the risk of social isolation and lost workers exist if we lose connections. In the USA, loneliness was recently found to be higher among many of our youth than among older adults (even those who are retired). Physical and mental health issues cannot be treated separately, just as work and personal life cannot be assumed independent of quality work or skills for successful performance. The organizations and the IT workers presented in these articles support a compelling argument for why they their holistic needs should be addressed with equal weight and together. It also highlights how important it is that we make thoughtful choices as we move forward. The implications are far reaching.

This culture of resiliency and adaptability applies to not only those who work in IT jobs, but the entire workforce. The evolution of technology requires a similar evolution in human skill responses. Equally as important, IT and all organizational leadership may need to question their own adaptability, biases, and limiting perspectives. As noted in Petter et al., there is still a strong bias against "gamers", even as there is a lack of understanding of neurodiversity or misunderstanding of the challenges and benefits of the virtual organization or non-traditional crowdsourced workers.

One challenge that every article touches on in one way or another, is communication and the willingness to disclose. Not everyone wants a full-time job, new work challenges, the ability to learn new technology skills, or to disclose their neurodiversity. These points hit home in the last eighteen months when I suffered a concussion and resulting post-concussion syndrome – often referred to as an "invisible illness" because one looks *normal*. Acting "normal", however, took an immense toll, but a part of me wanted to be able to do what I usually did. I was often torn between hiding my limitations and openly disclosing my challenges so that my colleagues would not incorrectly interpret my changed behavior and need for major accommodations. These accommodations included shorter periods of intense mental focus or writing and limited social interactions (Don't hate me, but I had a "get out of meetings card"; I also lived as a hermit who rarely left the house). I also had to address sensitivity to noise and light with noise cancelling headphones and sunglasses, and the necessity of significantly more rest than I was getting in order to combat dizziness, brain numbness, exhaustion, and headaches.

I was grateful for the flexibility my academic job offered, even as I was humbled when reflecting on those facing more permanent challenges and needs for accommodations. As I have worked virtually with students, colleagues, and with my editorial team on this special issue. This post-concussion experience, and the articles presented here, reminded me of the resiliency we learn from our past, that the rules of digital work can change, and we need to understand that there are choices to be made together. These amazing people – editors, authors, and reviewers alike, combined to help me make it into this future. Lessons learned that I carry forward.

Jeria's Thoughts

Most readers would likely agree that the divide between academics and practitioners is wider than desired. We tend to work within the confines of our institutional boundaries and fail to collaborate and collaborate in meaningful ways. Just over 15 years ago, Allen Lee and a team of pioneering academics took foundational steps to overcome this divide by establishing *MISQE* to be a home for leading practice-based research in the information systems field. The mission of the journal is critical: to disseminate research results in a manner that is relevant and demonstrates utility. In this vein, this special issue ties empirical research to actionable frameworks and interventions needed to address real-world challenges and opportunities presented by the changing digital workforce.

To truly leverage the benefits of the changing digital workforce and to manage the transformation, it is imperative that we continue to foster the dialogue between practitioners and researchers. The work presented in this special issue contributes to the foundation for this partnership. For example, many of the articles are co-authored by academics and industry experts who collaborate to bring insights to their work.

Also, as previously mentioned, through two workshops and a two-day track at SIM Connect Live meeting in Dallas in April 2018, authors worked with other leading academics and IT executives to refine their early manuscripts. Finally, all of the full manuscripts underwent multiple rounds of revision where drawing out relevancy and utility were guiding focuses. In the long term, we hope the conversations started in this special issue will continue and inspire future researcher-practitioner partnerships.

One area where I believe researchers and practitioners should continue to focus is **closing the persistent worker shortage in the digital workforce** despite the many actions taken to address the issue. Information systems and the IT function have evolved from a back-office support-function to a revenue-driving and strategic core of most businesses. This is welcome news for organizations standing to benefit from technology initiatives, but also presents an ongoing worker shortage. Looking back, our field has considered recruitment and retention issues ad nauseam with minimal gains. How do we find talent necessary to fill the ongoing and growing demands? How do we retain our people for the long term? Moreover, why do we continue to struggle with this persistent issue?

Looking forward, the solution may lay in two areas. First, we need to acknowledge that the IT skills shortage is a cultural issue. In many parts of the western world, an IT professional is perceived as a classic 'computer geek' stereotype (a quiet young male who is digitally savvy, but socially awkward).[24] This perception likely dissuades many, particularly women and minorities, from pursuing careers and opportunities in the field. Second, we need to cast a wider net in our hiring and retention practices. The digital workforce is not a niche profession and we need work to redefine our occupational culture and find alternative pathways into it.

Several of the articles in the special issue directly address recruitment and retention from these perspectives, and in doing so, bring novel and unanticipated considerations. For instance, Loiacono and Ren reframe what it means to be an IT professional and argue that employers should consider neurodiversity as an important component of their inclusion strategy. Petter et al. share a solution that organizations could quickly implement – to use video game derived skills as one consideration in the hiring process. Pflügler et al. problematize worker types and suggest that interventions to retain professionals should be varied and focused on polices beyond strictly salary considerations. With many levels of lessons learned – IT leaders could implement some of these solutions in the short-term and develop a plan to incorporate more long-term solutions.

Another area where I believe researchers and practitioners should continue to focus is **determining the key ways we can optimize and transform our industry and practices.** What does it mean to optimize? How can an organization transform? These are lofty questions with no simple answer. Looking back, it would seem that many of the actions to optimize and transform relied heavily on the *technology de jour and the silver bullet* of the day (e.g., mainframe computing, client-server computing, cloud-based computing, etc.). These are of course important considerations, but not to be overlooked is the importance of the human element. What makes the tech giants – Apple, Google, Microsoft – so successful is more than their product offering; it is also their employees and their critical skills. Educational institutions must consider how we can better prepare the future workforce though problem-based learning, service learning, and industry partnerships. Organizations are faced with decisions about employee training, work arrangements, and professional development.

Many of the articles in the special issue share exemplars of how we can optimize and transform successfully. Taylor and Joshi unpack some of the misconceptions of crowdsourcing and provide a viewpoint of how crowdsourcing can be advantageous for IS managers. Eckhardt et al. draw from experiences at Trello and Buffer to help IS managers consider ways in which their workforce can go virtual. To quote one of their industry interviewees, Brian Schmidt, Chief of Staff at Trello, "getting better at this is something that challenges us every day." Eden et al. describe the interventions taken to transform a large

24 See Guzman, Indira and Stanton, J.M. "IT occupational culture: the cultural fit and commitment of new information technologists," *Information Technology & People*, 2009, 22(2), 157-187, https://doi.org/10.1108/09593840910962212 . Also, see Guzman, I.R., Stam, K.R., and Stanton, J.M. "The Occupational Culture of IS/IT Personnel within Organizations", *ACM The DATA BASE for Advances in Information Systems*, 2008, 39(1), 33-50.

health services organization by focusing on the workforce. In all of these articles, the authors share valuable examples and raise provocative questions. We recognize that the transformation journey will be different for every organization. Learning from prior experiences, applying these lessons to your own organizational context, and being adapting in the process is key. All of these examples highlight the value of researchers and organizations working together to address important organizational and social issues.

Fred's Thoughts

In the short and medium term, IT managers will be confronted with the current manifestation of traditional human resource issues. Since computing was established in the mid-1900s, IT managers have been confronted with shortages of skilled IT workers, particularly in specialty and highly technical areas. As new information technologies emerge, a new crop of technical and application skills needs to follow. The IT manager is confronted with forecasting which of the new technologies will flourish, preparing to hire and train workers to utilize these technologies, and orchestrate this against the backdrop of changing overall work arrangements (e.g. outsourcing, crowdsourcing, open sourcing, and contract arrangements). A number of articles in this issue (notably Pflügler et al. and Petter et al.) address identifying, recruiting, and retaining IS workers in the field. We have lived with computers and Moore's Law long enough to anticipate a continued evolution; it may be time to develop systems forecasting future needs as thoroughly as we document current shortages.

Since its inception, the information systems field has faced lopsided worker demographics. Historically a digital divide has provided differential access to all resources related to computing (e.g. education as well as hardware and software). With the ubiquitous distribution of mobile phones and their ability to access all manner of digital knowledge, this may be changing. Nonetheless, in the foreseeable future, the IT workforce will be confronted with disproportionate numbers of participants from among the range of demographic categories. Potential solutions include recruiting from traditionally underrepresented groups, but may necessitate redesign of the workplace and structure of work fulfillment to take full advantage of emergent sources of IT labor. The Loiacono and Ren article most directly addresses this.

A third topic (addressed in different ways by the other three articles), focuses on the growing proportion of workers who are neither purely IS nor "end-users". In the future, it is likely that one subset of computing specialists will be needed to ply highly technical skills – though it is not clear how many of them will be working in specialized vendor and "cloud" computing firms, rather than embedded in non-IT departments within the client organizations. Another, perhaps small subset will continue in jobs relatively untouched by computing. However, increasingly a middle range of workers with varying amounts of computing responsibilities in addition to "end-user" tasks will come to dominate the work world (if it hasn't already). We see this with the "digitization" of a medical facility (Eden et al.), and with the expansion of virtual teams (Eckhardt et al.). We also observe this with the growth of a wide variety of flavors of crowdsourcing – everything from "go fund me" financing to co-creation of products, and contests for solving difficult technical and scientific problems. It is possible that computing becomes "invisible" to content and information users due to the background library of Internet content becoming a standard part of the work environment.

Predicting the future is always dicey – consider those who thought that maybe there would be a world market eventually for five computers.[25] Still, it may be riskier *not* to think about the future, develop scenarios, and consider possibilities.

It seems likely the continuum of computer related affordances and the skills necessary to implement them will continue to grow. On the technical end, we see operating systems, hardware devices, and virtualization continuing to adapt new complex strategies for continuing the progress of Moore's Law – perhaps not at the same exponential rate, but at a fast enough pace to continue bringing perpetual challenge into our lives. On the business delivery end, we envision increasingly diverse, effective, and

25 Fogarty, K. (2012). "Computerworld" | Oct. 22, 2012 7:00 AM PT; https://www.computerworld.com/article/2492617/it-management/tech-predictions-gone-wrong.html

invisible user interfaces. We see continually evolving sophistication of audio interfaces where individuals will be able to dialogue with computing interfaces to translate goals into actions. Such audio interfaces will likely merge with suggestion systems that carve pathways across vast numbers of users to previously posed questions. Such interfaces should integrate over time with visual 3D style interfaces. This would mean that in addition to seeing information or initiating action, individuals will be able to interact directly, but virtually, with devices of all sorts. Additionally we anticipate interfaces using the principles of games – performance feedback, positive reinforcement for success, graduated increasing challenge – to shift the whole spectrum of work from the mundane, to the most challenging, and into the realm of engaging activity.

As new generations of interfaces become ubiquitous, could we see the already fuzzy line between work and play continue to disintegrate? Might gaining points by controlling the self-driving tractor in an agricultural game and actual cultivation of the soybean fields become simultaneous aspects of a single application? The virtual farmer may move with a single toggle the use of virtually controlled tools for planting crops to directing the fence-mending robot. The good news, however, is that the workers entering this world are growing up in a ubiquitous Internet world. It is easy to imagine young workers wondering why the work world is not yet constructed like this everywhere and always, as many of the components are in place and waiting to be rolled out.

Kurzweil (2005)[26] presented a challenging vision of the future marked by a singularity where the rate of growth of knowledge is accelerating at an infinite rate. His predictions remind me of Y2K where the prediction itself created a feedback loop causing investments to keep the worst predictions from becoming manifest. Nevertheless, it is worth considering in the longer run what it means to work when no human physical effort is necessary to supply basic needs. What does such a future look like? Will the virtual ecosystem of social media create an adequate substitute? Will we be able to distribute the benefits of mechanical labor to consumers without eroding initiative and self-reliance? What else should we be doing in the short and middle time range to insure that we can avoid a dystopian future?

Tim's Thoughts

My first thought on optimizing the digital workforce is that firms need to learn what candidate profiles they really need. One way to do so is to close the gap between hiring and developing staff, and use data to continuously learn what works.

It is easy to say that people are a firm's biggest asset. Empirical observations, though, indicate that this key asset is often managed in a less sophisticated way than, say, any primary process or even the truck fleet. Too often, we manage the broader digital workforce and HR processes less based on evidence and mostly untouched by business process management and optimization. New societal values, increasing demands for workers and sophisticated skills, and more complex tasks and approaches towards an overall digital transformation highlight the central role of workers for running and changing organizations. Hence, there is great opportunity for research to disclose ways to find, develop and retain individuals, staff them in teams, and allow them to be as productive and happy as possible. Interestingly, there are some striking differences between scientific knowledge and observable practice concerning managing a firm's workforce. For example, Schmidt and Hunter have repeatedly shown that general mental ability (GMA) is a much better predictor of an individual's job performance than any other ability, trait, or disposition, and also better than job experience.[27]

There is also research on team efficacy, person-environment, and supplementary versus complementary fit concepts to configure teams according to properties of the individuals and tasks. Still, this is rarely reflected in hiring or staffing practice. One major way to help master the challenges of an uncertain future and make the best of available resources is to build a better HR capability by making better use of existing knowledge and by building a learning capability

26 Kurzweil, R. "The Singularity Is Near: When Humans Transcend Biology," *New York: Viking*, 2005.

27 See Schmidt and Hunter, *Psychological Bulletin,* 1998, Vol 124(2), 262-274 or Schmidt and Hunter, *Journal of Personality and Social Psychology*, 2004, 86(1), 162–173)

to enable better insights into what skills we need now and tomorrow. Looking into our data and the future, I expect successful firms of the future to be much better at actually knowing what job profiles they should be looking for. This implies knowing what has worked and what has not worked for specific job situations, beyond general tendencies that are valid for all jobs, such as ready and willing to learn.

Building an empirical foundation for evidence-based learning on staff assignment and development is the next big step in how firms will adapt to workforce challenges and opportunities. There is a great opportunity particularly in larger firms to use (big) firm data on historic job performance to disclose what makes an individual worker at certain tasks efficient and satisfied, instead of average and burnt out. These insights can be used for better team staffing, staff development and to continuously improve job descriptions and selection. However, this also requires overcoming the gap between finding and developing staff. Hiring and managing staff need to be truly integrated again. A side benefit of doing so is that modern candidates interested in a firm may use employee testimonials on anonymous social platforms as major information source if a firm is a desirable employer. Bored or dissatisfied employees thus spoil a firm's chances to find new or better employees, pushing employers to return to asking how to offer a work environment that allows employees to be satisfied. A better fit between job and candidate profile enables happier workers and thereby a better employer branding.

A second thought on optimizing the digital workforce is that firms need to develop and implement a 'new work' culture. As both firms and candidates are only beginning to learn what that actually means, this entails being open to reconsider how work is done and risking some experiments.

Data and experience show that the shape and meaning of work are changing. Data from annual firm and employee surveys of our Centre of Human Resource Information Systems (CHRIS)[28] at Bamberg University clearly show that many jobs from HR to IT have become more complex and require a richer portfolio of skills. While only a decade or two ago, hard skills largely determined a candidate's fit for a job, a typical job profile now is so complex that the required skills – to quote an executive from a global media company – *just don't fit into one person any more*. As a consequence, "the worker 2.0 is the team". This implies a necessary division of skills and labor among many individuals. Because teamwork requires communication and interaction, this also implies a much stronger need for interpersonal skills as well. Together with demographic developments all over the US and Europe, there are fewer candidates to fill more jobs that are more demanding. All this is good news for many employees. It is also great for our IT graduates, as their work now is often more interesting, challenging, and more likely to leave a relevant impact. For firms, though, the struggle to find and retain qualified workers has turned into one of their major strategic challenges. The annual SIM survey on key issues for IT executives regularly reveals the war for IT talent as a major pain on executives' minds that is only aggravated by the perceived need to become more digital or agile.[29] The modern and more confident worker increasingly uses his or her improved bargaining position to voice demands such as more work-life balance, less time at the office, and a job that not only earns money, but also fun and fulfilling. These are cultural facets of work that determine how attractive an employer is perceived, and hence how successful the firm will be in attracting and hiring candidates.

Many of the questions around the character of 'New Work' are difficult to answer, and firms and their employees are only beginning to develop a fuller picture. For instance, our CHRIS data show that workers working from the home office say they need to work a few hours per week more than their colleagues at the regular office to compensate for the suspicion that 'home office is no office'. At the same time, colleagues at the firm office perceive that they have to spend some extra hours to compensate for the missing hours from the co-workers at home because 'home office is no office'. Whatever the future of work – either a future with no boring work at all because the machines have taken over, or work satisfying many different quality goals and life aspects of the

28 https://www.uni-bamberg.de/isdl/transfer/e-recruiting/ Accessed: Nov. 5, 2018.

29 Luftman et al. Op. cit. 2018.

workers – it seems clear that cultural aspects will determine where scarce talent will work.

We have the chance to renegotiate the nature of work, and this should be reflected in the design of new information and work systems. Culture is central to this, and cultural alignment between values, systems, and processes is at the heart of new work. The Eden et al. article on healthcare and workforce transformation has shown that culture is a long-term and strategic aspect at the heart of any digital transformation. It is not enough to talk about new work and culture. It is time for firms to deliver on their employer branding promises and to actually implement and 'live' New Work. This also means to test new procedures by establishing a routine of trying out new things – like new ways of remote and virtual working – to learn faster than the competition. Eden at al. call this establishing "change-as-usual".

My third thought and suggestion to HR executives, in particular, is that we need to think more broadly about optimizing the digital workforce. Not only do we need to ask how we can digitize and transform HR practices, but how the HR expert can help the rest of the firm in their digital transformation. After decades of minimizing the role of Human Resources, we are seeing a resurgence in the centrality and new roles for HR. Chief People Office is a term that is emerging. The SIM surveys and most research on IT management[30] and IT value creation[31] have shown that IT business alignment is a key driver of IT value. The reason is that IT cannot provide value on its own, but needs to be synchronized with other – non-IT – resources and processes to be effective. If employees are the main resource, we need better workforce alignment. Digital transformation involves changing processes and values and has made most workers at least partly IT workers, creating a similar demand for alignment among individuals, teams, processes, and the entire organization. In line with the insights of all articles in this special issue, this will transform the role of the HR function again.

Over the past 20 years and driven by technological advancements and innovations,[32] HR has changed from mostly standard task processing to a complex array of internal and external consulting. It is important to relieve HR staff from routine tasks and refocus their roles so they can address better aligning HR processes with the rest of the firm. Our data show that for the first time ever recruiters demand more automation, AI-based tools, and the like. This is because they are so burdened with old routine tasks that there is not enough time to face the new challenges and to shape the digital transformation of HR and other processes. Considering the core role of workers in any digital transformation, an alignment of HR and non-HR processes seems one of the most important paths to master the dual challenge of digital and workforce transformation. The Eden et al. article in this special issue highlights how the practices of flexing, deepening, and revitalizing link these transformations.

Strategic Imperatives

The articles included in the two *MISQE* special issues (17:4 and 18:1) provide practical and insightful advice for CIO's, HR executives, other organizational leaders, and IT workers. In addition, we have shared some of our own thoughts and reflections. To close the Dec. 2018 special issue editorial, we leave you with four integrated imperatives for the near term and moving into the future.

1. Embrace and leverage societal drivers of the evolving digital workforce

Alignment of IT with business goals has been a top issue for IT leader for decades. As evidenced by all of the organizations who shared their experiences here and in the next issue, alignment of your IT strategy and digital workforce strategy with global and societal changes is just as important. Leading organizations emphasize that you cannot disentangle your organizational goals from your communities, customers, and society. To be successful, alignment with society's needs, diversity, and emerging work arrangements is

30 See Wagner, H. and Weitzel, T. "How To Achieve Operational Business-IT Alignment: Insights From A Global Aerospace Firm," *MIS Quarterly Executive*, 2012, 11(1), 25-36.

31 See Wagner, H., Beimborn, D., and Weitzel, T. "How Social Capital among IT and Business Units Drives Operational Alignment and IT Business Value," J*ournal of Management Information System*, 2014, 31(1), 241-272.

32 See Weitzel, T., Eckhardt, A., and Laumer, S. "A Framework for Recruiting IT Talent: Lessons from Siemens," *MIS Quarterly Executive*, December 2009, 8(4), 123-197

more than philanthropy; it is a critical success factor. Similarly, the social impact of your employment practices is especially important for IT leaders where new technologies will disrupt or displace workers or jobs. Organizations already have to adapt to the aging of the workforce and loss of skills and experience. At the same time, there is an assumption that younger generations adapt more easily to technological changes. While new IT workers are graduating each year and bringing new skills, it is a fallacy that we will age-out the older generations who must learn and adapt to new technologies. There will always be new technologies and those who have to learn and adapt to them, versus those who grow up with them. The children of today may be no better prepared to deal with future radical technological changes than the generations before them.[33] Aligning with societal drivers and/or values will help you identify and respond to shifts in the digital workforce. Broaden your thinking about alignment now, because changing your culture takes time and benefits will accrue the sooner you start.

2. Organizational culture, IT culture, and digital culture are inseparable

An overarching lesson is that culture matters as a foundation for organizational transformation. We know that establishing a culture that embraces flexibility, continual learning, and customer focus is critical for organizational transformation. Some lucky few may already have such a culture in place, others may think they do until it is tested, and others will know that building such a culture will take vision, persistence, attention to traditional human resource activities such as hiring, training, and career path, and continual cultivation. Increasingly, a culture of change-as-usual needs to be balanced with an environment where experimentation, evidence based change, and exploration can be integrated. Moreover, culture is not a single variable with a predictable outcome, but rather culture is something that is reshaped continuously. More than the culture within IT, or the organizational culture in relation to IT, the concept of a digital culture needs to be embraced. This includes aligning your culture, your full-time and part-time workforce, and your own role in developing sustainable, inclusive, and trustworthy digital future. Strive to increase transparency so that all workers know why change is necessary, for example, through interdisciplinary and skip-level meetings, and collaborative visioning.

3. Create and foster initiatives toward increasing inclusiveness and diversity

Engage in discussion with your employees, customers, community, and your leadership on what the digital workforce will and should look like in the future. Diversity of the digital workforce is much more than demographics. Managers must consider critical questions: have you engaged with your diversity and HR leadership to discuss what inclusion means, what diversity initiatives are already in place, and how to optimize these to source and retain potential IT talent? To be successful in the future, you will need to embrace diversity in how you define the broader digital workforce, the IT worker, and the IT leader. As such, revisiting your practices for sourcing, attracting, recruiting, developing, and retaining will help you identify areas that have embedded systemic bias or rigidity. How are your values embedded in your practices? Do not underestimate the importance of top-down and bottom-up communication of the organizations goals, or how roles and departments fit into achieving these goals. While this may sound like rhetoric, each of the articles included in the special issues address the importance of accepting differences and encouraging personal relationships, trust, and open communications. This is not easy, especially in larger companies or those with distributed workers, but is a tone set from the top. Beyond digital communications like email, texting, tweeting, Instagram, or video, is the importance of getting to know people as individuals. This issue remains the same, even as we ready for the ongoing transformation of the digital workforce.

4. Rethink and reimagine workforce practices that are adaptable and evidence based

Link digital and workforce transformation by "Flexing, Deepening, Revitalizing". Do not just talk about the importance of learning; embrace and support it from the top. What are

33 World Economic Forum. Op. cit. 2017.

you doing that enables or inhibits optimizing your access and engagement with the evolving digital workforce? Is your firm exploring new options to source the evolving IT workforce? Have you developed a task-specific means of curating and managing sourcing portfolios? Have you assessed your contracting arrangements to address the full range of workforce options, including task redesign to address security issues? Has your organization evolved to consider alternative or modified recruitment techniques that may provide greater insights into the talents of neurodiverse candidates of all types? What assumptions do your people hold about where people acquire their IT skills and what those skills actually are? The so-called "soft" and "hard" skills are both important to success in the digital economy. Are you continuously working to identify better practices and evolving your work culture to both anticipate and respond? Are you systematically learning based on facts? Do you have the metrics and process in place to verify your interventions are working? To be ready for the future, you should revisit your major pain points now. Then, open dialogue, and discuss broadly where you wish to invest in the changing digital workforce to be ready for the future. Encourage visioning and scenario analysis exercises to identify issues that will have to be managed in the medium and longer term.

The IT workforce has changed and continues to change

We titled this special issue *"New Approaches to Optimizing the Digital Workforce"* because we believe current conceptualizations of IT workers housed within a formal IT department is dated and limiting. This applies whether you have your own IT group, or outsource your information systems development needs. A shared lesson learned across all the articles is that there is much to be learned from a broader definition of *who and where* the IT workforce and IT skills actually are. Increasingly, IT work has bled over into the line and support areas of your organizations. The so-called "shadow IT" in organizations has created new challenges, but also reflects digital skills, needs, and innovation embedded outside the formal IT structure. Have you envisioned the changes to work and the role that technology might play in the next ten to twenty years? Are you engaging with researchers and actively learning from experience elsewhere to facilitate evidenced-based improvisation? The mode of working is also shifting, and this is especially true for those who can work virtually, are challenged by traditional office settings, want better work-life balance, or who want to embrace the flexibility the GIG economy offers. Retaining your digital talent is a longer-term issue that requires maintaining good relationships with current and former employees. Keep transformation going by collaborative visioning, evidenced-based improvisation, and managing tensions.

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