MIS Quarterly Executive

Volume 22 | Issue 2 Article 5

June 2023

Managing Where Employees Work in a Post-Pandemic World

Molly Wasko

Alissa Dickey

MIS Quarterly Executive

Managing Where Employees Work in a Post-Pandemic World

The successful transition to remote work during the COVID-19 pandemic raises the question of whether all employees should return to the office. We describe how a large manufacturing company successfully separated business processes from the physical place of business during the pandemic and explore the daunting managerial challenges of a return-to-work plan that addresses employees' post-pandemic expectations and doubts about the value of co-location. We provide recommendations for managing a blended workforce (comprising virtual, hybrid and on-site workers), particularly in organizations with high levels of physical operations.[1,2]

Molly Wasko
University of Alabama at Birmingham
Collat School of Business (U.S.)

Alissa Dickey
University of New Mexico
Anderson School of Management (U.S.)

Deciding Where to Locate Work After the COVID-19 Pandemic

During the COVID-19 pandemic, 39% of U.S. employees worked exclusively from home rather than in traditional workspaces.[3] Although working from home provided challenges for businesses, the capability of information and communication technology (ICT) to support virtual work during the pandemic has called into question the need to return to the office. The response to the COVID-19 crisis has significantly changed employees' expectations about where and when work will be done in the future. However, unlike employees, many executives are not convinced that virtual working is a good thing. In a recent memo to Tesla and SpaceX workers, Elon Musk shocked employees and investors alike with his demand that all employees return to their workplaces. Apple also announced a return-to-the-office policy, only to rescind it in the face of major employee pushback.

In the U.S. (and elsewhere in the world), there is a debate raging among senior business executives about the best working arrangements in a post-pandemic world. Should businesses follow Elon Musk's lead and require all employees to return to the office, abandon expensive office space altogether or adopt a hybrid arrangement that includes both working at home and in the office? This question is of particular importance to IT executives, as it directly impacts decisions on new investments in ICT and how to effectively separate work from place to support a virtual or hybrid workforce.

1 Vess Johnson is the accepting senior editor for this article.

2 The authors thank Vess Johnson and the three anonymous reviewers whose insights and suggestions helped significantly in the framing of the study and recommendations. We also gratefully acknowledge the support from the corporate sponsor, referred to anonymously as IMC.

3 Saad, L. and Wigert, B. *Remote Work Persisting and Trending Permanent*, Gallup, October 13, 2021, available at https://news.gallup.com/poll/355907/remote-work-persisting-trending-permanent.aspx.

DOI: 10.17705/2msqe.00078

In this article, we address how organizations can successfully build on the virtual working capabilities developed during the pandemic to inform decisions about the location of work in the future. To date, attention has been mostly directed at information-oriented organizations that can completely digitize operations. However, we describe the post-pandemic business continuity and return-to-work efforts of a dominant, incumbent industry player in the industrial manufacturing sector. The insights from this case will help organizations balance the physical and digital elements of their business operations to meet the ever-increasing demand for consumer and industrial products.

Our findings are derived from an 18-month study of this organization, which we refer to anonymously as "IMC" (Industrial Manufacturing Company). The study methodology, which included a survey, is described in Appendix A. The study was designed to examine the impact of the pandemic from the perspective of organizational capabilities and managing disruptive change.[4] We investigated how IMC's organizational capabilities, consisting of its unique combination of resources, processes and values, have changed since the onset of the pandemic. While resources like people, facilities and technologies are fairly easy to change in response to a crisis, an organization's processes and values are more enduring. The pandemic was an external shock that forced organizations to drastically change their business processes. It created a crisis of co-location characterized by the need to reduce in-person interactions to prevent the human-to-human spread of the virus.

The study focused specifically on how ICT resources were used to develop new business processes to accommodate virtual work during the pandemic, and how these new processes are now creating tensions with the organization's values as employees are being recalled to work on-site. In this article we:

- Describe how information and communication technologies enabled ongoing business operations by allowing virtual work to be done by parts of the IMC workforce
- Describe the consequences of a dislocated workforce, the impact on IMC's core values and the implications for the future of work at this organization
- Provide actionable recommendations for how other organizations can make ICT investments to support options for virtual, hybrid and on-site working that align organizational values with the expectations of a post-pandemic workforce.

Our analysis of the IMC case provided three key findings. First, in most instances employees were able to adapt ICT, sometimes in unexpected ways, to separate the information processing needs of specific work activities from the physical requirements of co-location. Second, while the workload for virtual employees increased significantly at the start of the pandemic, surprisingly, the employees who were required to continue working on-site throughout the pandemic felt the most isolated and least valued as the pandemic wore on. Third, business leaders continue to have a strong preference for co-locating employees because they believe co-location is inextricably linked to building and maintaining their companies' core values. This preference remains despite the high levels of productivity and customer satisfaction experienced during the pandemic and virtual workers wanting the continued flexibility of working from home.

Based on these findings, we provide recommendations for how organizations grounded in physical operations can balance the desires of some employees to continue working virtually while carefully considering the needs of employees who remain on-site at the workplace. If those who work exclusively on-site are not managed effectively, they may end up feeling less respected and less committed to the organization's value system in a post-pandemic world.

About Industrial Manufacturing Company

Industrial Manufacturing Company (IMC) is a 100-year-old privately held global manufacturer and distributor of heavy-duty, specialized vehicles, which we refer to as

4 Christensen, C. and Overdorf, M. M. "Meeting the Challenge of Disruptive Change," *Harvard Business Review* (78:2), March-April 2000, pp. 66-75.

"industrial trucks." These trucks are used by business customers and municipal governments in sectors like construction, energy, utilities and telecoms. IMC is headquartered in the southern United States and has three body manufacturing plants, 12 operations facilities and approximately 45 service centers across the U.S. and Canada. Internationally, IMC provides products and services in over 100 countries and has relationships with over 65 distributors. Known for its innovative products, IMC holds more than 60 patents that influence the design and manufacture of its products. Innovations include designs that maximize operational efficiencies, increase safety and improve working conditions for equipment operators. Advances are incorporated using customer feedback as a primary driver of new technology developments. IMC also provides customer support services such as safety training, expedited support during disasters and times of crisis, and equipment financing.

IMC has an interesting relationship with responding to crises. Not only are its industrial trucks essential for building and maintaining national infrastructure and public safety, but when a natural disaster occurs its customers often rely on IMC to help mobilize trucks to respond to local disaster recovery efforts. As a consequence, IMC has become expert at assembling geographically distributed physical resources to quickly converge on a single location. Its experience in supporting customers during times of emergency means that it has a crisis-readiness mindset embedded in its organizational culture.

Pre-Pandemic Working Arrangements and Operations at IMC

IMC has a hierarchical organizational and governance structure, and business operations are divided into functional areas, organized around the company's primary and support activities. The five primary business operations that connect directly to customers are Manufacturing & Operations, Engineering & Design, Sales & Marketing, Technical Sales Support and Financial Services. The two key support activities that help make primary activities more effective are Administrative Support (e.g., accounting and human resource management) and Information Services. Pre-pandemic, IMC associates (i.e., its employees) across all functional areas worked on-site at various IMC facilities with two exceptions: salespeople who work directly on-site with customers, and traveling technicians who are responsible for repairing and maintaining customers' trucks in the field. Thus, the pre-pandemic working arrangements at IMC were classified as either on-site or remote, with the vast majority of associates working on-site at IMC facilities.

Two essential organizational values define IMC's culture: 1) customer needs come first and 2) IMC's associates are the company's greatest strength. The alignment between the organization's commitment and the associates' dedication to these values has resulted in a highly devoted and motivated workforce that identifies strongly with the organization and its mission. IMC's clear customer-first focus has made it the industry leader with a multiyear backlog of orders. This has also resulted in a company culture that prioritizes manufacturing, operations and customer service, with a particular focus on supporting frontline associates working to meet the multiyear backlog of customer demand. IMC believes that co-locating the majority of its associates on-site and the resulting work environment has been crucial for creating and maintaining its powerful corporate culture.

Prior to COVID, IMC's ICT investments were focused on manufacturing and design capabilities for developing highly advanced and cutting-edge products in its industry. The company did not prioritize the implementation of advanced ICT systems internally to serve administrative and support functions. In the words of a Manufacturing & Operations associate, "[Pre-pandemic] IT functioned mostly as a support mode that helped improve production efficiency."[5] Most frontline workers in Manufacturing & Operations had no need to access ICT to do their jobs and were not even given company email addresses. These frontline workers relied on face-to-face communications for the coordination of work within and across functional areas.

5 Other quotes from IMC associates gathered during our research are included in Appendix B.

This view of ICT investments and the role of Information Services directly aligned with IMC's culture, where no investment was too great when it served external customers, whereas IMC associates and business operations relied on information services that were "good enough" without too much sophistication. Furthermore, IMC's customers did not demand much sophistication from support services, as their own IT units were also typically not cutting edge.

Thus, prior to the pandemic, Information Services was primarily viewed as a support function rather than as a strategic partner in the business and focused on three areas: 1) maintaining the enterprise resource planning (ERP) platform, 2) enabling internal file storage and email communications through Lotus Notes, and 3) creating a robust customer service interface and e-commerce web presence for customers. One of the most influential pre-pandemic Information Services projects was the migration to Office 365 in 2019, replacing IMC's old Lotus Notes email and file-sharing system. Office 365 was methodically rolled out, with training events that personally engaged with and educated associates with computers, primarily those in support functions. Before the rollout, there was skepticism that all associates would even be willing to migrate from Lotus Notes to Office 365.

How IMC's Working Arrangements Changed During the Pandemic

Unlike many organizations that faced "stay-at-home" orders during the COVID-19 pandemic, IMC was deemed to be an essential operation and had to "stay at work," which presented the company with a diverse set of challenges. Ironically, despite its crisis-readiness mindset, IMC experienced higher levels of disruption than its customers. Though IMC's customers were still able to continue operations because they were primarily individual operators or small teams working outdoors, IMC relied heavily on indoor business operations using heavy equipment, machinery and designated workstations. The continued operations of IMC's customers created a steady demand for the company's products and services, but IMC's own business operations were significantly disrupted, making it difficult to fulfill customer demand.

IMC therefore needed to quickly identify how to continue operations while minimizing the co-location of people to prevent the human-to-human spread of the COVID-19 virus. IMC's underlying core capability and cultural norm of rapid response in times of crisis was essential in motivating the workforce to adapt, and vital to the company's success in maintaining business continuity. This cultural norm, combined with IMC's dedication to associates (which included keeping all associates employed with no furloughs) and its "customer-first" commitment, enabled IMC to respond to the pandemic in a way that balanced the needs of associates and customers.

IMC's priority was to keep operations running while minimizing the number of people co-located in its facilities, which resulted in significant variations in work arrangements across the different functional units. Support activities were asked to work virtually for the better part of two years. Primary activities were mixed. Sales & Marketing and Financial Services associates worked virtually and Engineering & Design associates worked a hybrid schedule where half would come to work each day to allow for social distancing. Manufacturing & Operations associates continued to come to their physical work locations with new safety protocols in place, including face masks, temperature checks, social distancing, travel restrictions and additional cleanings throughout the facilities. As a result, the previously co-located workforce was split into three groups: the virtual associates, the hybrid associates and the on-site associates.

The decision of which positions to keep on-site was driven by a single factor: the physical intensity of work activities. Jobs with high physical intensity were those characterized by: 1) activities that needed to be done by people co-located with fixed equipment and machinery; 2) activities that maintained and enhanced physical infrastructure; and 3) activities that required synchronicity—i.e., working on tasks conducted at the same time and in the same place. Associates in high information-intensity support jobs were sent home. These associates would end up figuring out through trial and error how to use

ICT to replace work activities that had previously been performed on-site.

How these shifts were experienced and perceived by IMC associates varied drastically depending on whether they were in the virtual, hybrid or on-site group. For example, Sales & Marketing associates viewed ICT investments that enabled sales growth, such as online ordering and social media, as highly successful. However, Manufacturing & Operations associates felt that they were stuck in a significant and persistent crisis because they were unable to increase production and delivery. Therefore, investments in ICT had both positive and negative impacts, depending on the functional area. The benefits of ICT to support information-intense work, such as sales and support services, ran up against significant bottlenecks when interfacing with high physical intensity work activities, such as manufacturing and distribution.

We now describe how the use of ICT resources impacted each of the three groups of associates during the pandemic, focusing on changes to business processes and how these changes created tensions with the organization's values.

Impact of ICT on Virtual Associates During the Pandemic

IMC associates in support functions like HR, accounting and Information Services were asked to work virtually throughout the pandemic. However, IMC made a clear distinction between virtual and remote worker categories. The term "remote" referred to "off-site" associates who worked at non-IMC locations/facilities pre-pandemic—i.e., those who worked on-site with customers. The term "virtual" referred to "off-site and online" associates—i.e., those who worked on-site in IMC facilities pre-pandemic but were now expected to work online via information and communication technologies.

When deciding which associates could be classified as virtual workers, IMC discovered that even high information-intensity work activities could still have a significant physical component. Associates who moved to virtual status needed access to information through physical resources like computers, monitors, printers, cameras and microphones. To ensure that virtual associates had the necessary physical resources, IMC allowed them to come into work and take equipment home when possible and purchased additional physical assets as needed. Because so many people were sent home all at once, there was a high demand across the U.S. for these physical assets, resulting in significant lag times caused by delays in obtaining the physical resources.

Extra complications included virtual associates needing a private, physical office space with comfortable chairs, office furniture and desks, and a reliable high-speed internet connection. IMC found that managing the physical component of work activities for virtual workers created the most significant challenges, especially at the beginning of the pandemic and particularly for associates with spouses and children who were also at home.

In terms of work processes, switching from on-site to online virtual working meant that associates had to change how they managed information, and they quickly realized that the more advanced technologies available in Office 365 were essential for replacing face-to-face interactions and shared workspaces. Though the old Lotus Notes system supported file sharing via email attachments, most files had been stored on local hard drives, which created a physical limitation because associates had to be co-located with the hard drive storage device.

The most frustrating system to use from home was IMC's Oracle ERP platform because a virtual private network (VPN) was required to access it, which with other security restrictions made the system slow, clunky and prone to disconnect during use. Instead of trying to access the ERP system virtually, associates ended up either driving to their office to use the system or having an on-site colleague take over their ERP work activities. Had IMC not invested in Office 365 before the pandemic and been forced to rely on Lotus Notes and Oracle ERP for the coordination of work activities, virtual associates would have been severely limited in the work they could do away from IMC facilities. File sharing would have been limited to local hard drive storage devices and exchanges through email. Moreover, a new system, such as Zoom, would have been needed to support virtual meetings. Significant investments in home computers would have been needed to make the VPN faster and more user friendly. These challenges faced by IMC as it established

virtual working during the pandemic highlight that even high information-intensity work activities can still be constrained by the physical limitations of ICT, such as security restrictions, how files are stored and shared and whether associates can conduct meetings online.

Office 365, with its cloud storage and mobile applications, allowed IMC associates to access information and software essential for performing work anytime and anywhere. Virtual working via Office 365 was made secure through two-factor authentication, but access through the VPN was not required. Teleconferencing through Microsoft Teams allowed associates in different work locations to meet. The use of Office 365 was also essential for ensuring ongoing connectivity with IMC's partners and suppliers that were also using the same Office 365 applications. These applications were also available on mobile phones and tablets, which enabled associates and customers to "meet on the road" and thus facilitated anywhere, synchronous communications. In many instances, Office 365 provided associates with better connectivity than before the pandemic when communications were largely conducted through phone calls.

However, many IMC associates experienced a significant learning curve to become proficient in using the new systems. Combined with the creation of new work processes, such as tracking the location of the physical assets sent home and the performance of virtual workers, this initially increased the workload for virtual associates. HR staff in particular saw a significant increase in added responsibilities:

> *"HR people were really having to pick up extreme workloads: Adding in contact tracing, ensuring associates were abiding by the COVID protocol, counseling with associates who had family members infected, dealing with changing government requirements, which included CDC [Centers for Disease Control and Prevention] recommendations, OSHA [Occupational Safety and Health Administration] requirements, unemployment, mandatory COVID leave, implementing required and additional COVID compensation/incentive plans, [skyrocketing] recruitment efforts, etc."* HR Manager

In terms of corporate values, the pandemic shifted IMC's focus from prioritizing frontline workers in manufacturing and operations to supporting its virtual associates to ensure they did not feel isolated from the company and its activities. It is notable that, though information and communication technologies enabled asynchronous non-co-located knowledge work, IMC felt that maintaining synchronous human connections was an essential part of staying linked to virtual workers. Like many organizations, IMC offered social events and other activities to promote engagement and help virtual workers feel more connected with the organization. After the initial steep learning curve, and once newly created work processes had become normal business practices, virtual workers were relatively satisfied with the off-site, online work arrangement.

Impact of ICT on Hybrid Associates During the Pandemic

Engineering & Design associates were asked to adopt a hybrid work schedule during the pandemic, alternating between working in the office and working from home. Similar to their virtual colleagues, hybrid associates adopted Office 365 to communicate and process information. However, Engineering & Design jobs also have a significant amount of physical work activities that require interaction with material things, such as maintaining production equipment, designing and assembling components, keeping track of inventory and monitoring the performance of finished trucks. At first, these associates felt like they were never in the right place at the right time because the information needed to accomplish work activities was not available in the same location as they were. To address this challenge, hybrid associates developed new processes to either "bring the associate to the work" such as showing someone on the manufacturing floor how to fix a piece of equipment, or "bring the information from work to home," such as seeing how a custom-design part fitted with other parts on the truck.

One of the ICT-enabled workarounds that became essential was "facetiming," a term coined to describe a work process where an at-home associate on a computer was in a teleconference with a person on a cell phone walking around the

production facility. This capability was essential when a technical issue or mechanical failure happened in a facility but the person with the most relevant expertise was working at home. This ability to "see and hear" in real time but from different locations was often sufficient to accomplish tasks on an as-needed basis. One of the core insights gained from this experience is that IMC associates became much more adept with the use of ICT to digitize sight and sound and separate this information from synchronous time and physical place.

Another work process that was modified was the monitoring of trucks and truck performance in the field and the availability of parts. When the information needed was on the truck itself, Engineering & Design associates relied extensively on Internet-of-Things (IoT) technologies to gain information and insights directly from the truck. One Engineering & Design associate said: "IoT is the most essential technology needed for remote work during pandemics." IMC's trucks have embedded IoT technologies that enable advanced design, manufacturing, maintenance and support. During the pandemic, IMC associates and customers relied even more heavily on embedded IoT technologies to provide information about the trucks "on the go," including location, status and running operations.

In terms of corporate values, while associates found the initial shift to hybrid working frustrating, once a few modifications and technologies were in place, hybrid associates reported being the most satisfied out of all the work groups. They appreciated having the flexibility to work from home and provide family coverage if needed, while also being able to get out of the house a few times a week to work with colleagues. Ironically, although hybrid associates started out feeling like they were never in the right place at the right time, they ultimately ended up feeling like they had the best of both worlds.

Impact of ICT on On-Site Associates During the Pandemic

IMC's Production & Operations associates fell into the on-site category because their work requires the use of specialized equipment and facilities. These associates therefore operated most closely to "business as usual" during the pandemic and continued coming to work at IMC locations. However, several safety measures were introduced to prevent the spread of the virus, including the need to wear masks, maintain social distancing and limit the use of breakrooms, elevators and restrooms. Unlike their virtual colleagues, there were constant, highly visible reminders in the workplace (e.g., masks, one person using the bathroom at a time, COVID safety protocol signage, empty parking lot) that the work environment for on-site workers had changed. The visual safety cues surrounding on-site associates provided a relentless reminder of the constant threat posed by the virus. Furthermore, there was a common sense of fear and concern about the dangers associated with coming to work and catching the virus. On-site associates became somewhat disheartened with the organization because they felt that they were being asked to take on the extra burden of these significant risks, while their virtual and hybrid colleagues were getting the benefits of working from home.

Before the pandemic, these on-site associates did not need ICT for information because the primary methods of information exchange occurred at work via face-to-face conversations and notifications within the facility (e.g., via bulletin boards). They did not have access to computers or even have email addresses because there was not a perceived need to communicate via technology. However, with masking, social distancing and other safety protocols in place, the face-to-face communication channels used by on-site associates were severely curtailed. Furthermore, the absence of Administrative Support associates in the building cut on-site workers off from the face-to-face interactions that connected them with their support colleagues, most notably the serendipitous social interactions that used to occur just from walking in from the parking lot or sharing the breakroom each day.

Of all three groups of workers, on-site associates felt most strongly that IMC's response to the pandemic hindered their ability to know where to turn to get needed information. IMC addressed this concern by installing computer terminals throughout the manufacturing facilities so that on-site associates could communicate with essential support services and obtain

needed information from the production floor. This is an example of IMC implementing ICT systems in new areas as a means to expand communication channels beyond face-to-face.

The on-site associates also experienced significant disruptions in operations due to supply chain problems. Procurement staff reported that the "supply chain operation is also facing a major crisis due to long lead time[s] and raw material shortage[s]." There was a large demand from customers to produce more trucks and truck parts, so there was plenty of work in the pipeline. However, it was difficult to maintain operations when the availability of raw materials was so sporadic. This led to a sense of frustration that Manufacturing & Operations associates had not experienced before; they had always felt that they were the company's top priority. This sense of frustration was compounded by the lack of other colleagues in the building, a very visible reminder that not everyone was treated the same during the pandemic.

These changes resulted in the on-site workers feeling very isolated at work, whereas, ironically, IMC leadership was more concerned at the time about virtual workers feeling isolated at home. At first sight, it may appear counterintuitive that the associates whose work processes were least disrupted by maintaining (relatively) normal business operations ended up feeling the most dislocated. Though all associates were highly positive about IMC's response to the COVID-19 pandemic and overwhelmingly grateful to still be employed, the on-site associates reported the lowest levels of work-life balance and employee satisfaction. Digging into this deeper, there was significant angst associated with being "left at work," not knowing how to reach their virtual colleagues and the stresses at home resulting from having to work alongside others, especially for those with families.

IMC's New Post-Pandemic Blended Workforce

By spring 2022, pandemic restrictions had been lifted across the majority of IMC's global facilities and the company decided to continue operations with a "blended" workforce, balancing associates' desire for greater flexibility with the need to support physical operations. The decision to move to a blended workforce including virtual, hybrid and on-site workers was driven by the need to find a balance between the company's two core values: 1) customer needs come first and 2) associates are its greatest strength. IMC learned through direct experience that performance and customer satisfaction remained high during the pandemic, something that would have seemed unimaginable to leadership and associates alike before the crisis.

Virtual associates have the most flexibility with the ability to work from home and set their own on-site work schedules. Hybrid associates can continue to work from home a few days each week, while on-site employees are expected to come to work as they have always done. IMC's virtual and hybrid associates have become accustomed to the flexibility of working from anywhere, and given the severe competition for knowledge workers in the post-pandemic environment, the company sees this flexibility as a competitive advantage for attracting and retaining high-quality associates.

A key consideration for the future is how to reallocate office space that had once been used by virtual and hybrid workers to provide additional manufacturing and operations support. However, the biggest continuing concern is the long-term impact of a blended workforce on the company's culture, values, performance and customer satisfaction. Before the pandemic, those now categorized as virtual associates had a long history of working with colleagues in a face-to-face environment, felt a deep sense of identification with IMC and were able to leverage their strong interpersonal relationships during the move to online working. IMC is concerned that as new associates are brought into the company, developing and maintaining these connections, and ultimately the commitment to the customer, may suffer if new hires are allowed to work completely virtually from day one. IMC leadership clearly believes that the co-location of associates is inextricably linked to the development of emotional bonds among associates and a sense of commitment to the organization's value system and long-term organizational performance.

Another change brought about by the pandemic is that IMC associates are now more open to the adoption of new ICT, enabling the

company to progress toward even greater digital transformation across the entire organization. Virtual and hybrid associates want to see the expansion of ICT systems that support internal virtual knowledge work, as well as greater deployment of ICT that supports external communications, such as increased social media engagement with customers. Hybrid and remote workers want to see the expansion of IoT applications and are interested in more robust "facetime" technologies, including augmented/virtual reality and mobile visual communications. Even on-site workers are embracing new technologies, including the expansion of communication technologies in production facilities to eliminate paper and expanding the use of automated/robotic processing in manufacturing. Implementing and supporting this wide range of new capabilities will increase the scope, reach and responsibilities of IMC's Information Services group.

The IMC case illustrates that the company heavily relied on Information Services to develop new online systems to meet changing work requirements, such as tracking equipment and COVID cases, virtual work requests and updated performance evaluation and monitoring systems. Information Services was also responsible for implementing the technology necessary to support dispersed associates. Going forward, ICT investments will differ drastically according to job roles. For example, Sales & Marketing sees adding more social media engagement as key for the future, whereas Engineering & Design views continued investments in IoT as crucial and would like new technologies that enable a richer telepresence experience to replace the need for co-location. Because of this variation, Information Services will need a diverse set of skills to design, implement and maintain a far more complex portfolio of digital technologies and to manage a more strategic integration of IT investments across the organization.

IMC is still grappling with the tensions between a blended workforce and changing attitudes toward co-located work, especially the perception among on-site associates that they have lost their priority status in the organization. The actual costs incurred by on-site associates working in co-located facilities became much more transparent as a result of the pandemic. Virtual associates quickly adjusted to the new way of working once ICT resources and new information processes were in place. Interestingly, although these associates say they have experienced a significant increase in productivity since working from home, the way productivity is described means that they have more personal time to do other things because they no longer spend time commuting. There are also the financial costs associated with commuting, including the need to live in more expensive areas within commuting distance, maintain a car and pay for gas, or pay to use some other form of transportation.

Even though the conditions for on-site associates have not changed (they had to come to work before the pandemic), the fact that other associates are benefiting from greater flexibility regarding when and where they can work, have more time to do other things and benefit from no or reduced commuting costs has left on-site associates feeling like the biggest losers post-pandemic. At the same time, when it has been suggested that virtual and hybrid associates return full-time to the office, these associates really question the benefits of doing so, and have in turn pushed back against an across-the-board return-to-the-office mandate. While returning all workers to IMC facilities would make on-site associates feel prioritized again, it would come with the potential cost of demoralizing the other two groups. This is how one on-site associate perceived the situation:

> *"I felt like I was hit by a bulldozer mentally (or maybe it was a [company] truck). I was never sent home, but I definitely did not go into "work" as I knew it for over a year. Meetings that previously took place in person were restricted to Teams. I felt a strong reduction in my personal purpose, general satisfaction and overall effectiveness at work."*

This perception contrasts sharply with that of virtual associates who have now had to return to work: "We were sent home with little to no notice for an indefinite amount of time. We are now back in the office, and keep asking for any update to virtual work."

In summary, Table 1 describes the interplay of ICT resources, work processes and corporate

values at IMC pre-pandemic, during the pandemic and the new post-pandemic blended workforce. This table highlights changes over time by functional areas along with the information intensity and physical intensity of specific work activities in addition to changes in ICT resources, processes and perceptions of organizational values.

Recommendations for Managing a Blended Workforce

IMC's experience in mitigating and responding to the shocks of a global pandemic points to the need to consider both the information intensity and physical intensity of work activities to make decisions about where and when work gets done in the future. Moreover, the information and physical intensity of work should be evaluated across the organization, with increased scrutiny at the intersections between virtual, hybrid and on-site workers—i.e., where work activities transition from mostly digital to mostly physical—to ensure availability of the necessary information and seamless coordination. However, while ICT can be leveraged to address the issues related to digitizing work activities and business processes, the more enduring challenge of whether ongoing operations should be brought back to the workplace needs to be driven by the organization's values. IMC has decided to continue offering the four different work arrangements (on-site, remote, hybrid and virtual) based on its organizational values. The decision on which category a job fits into is made on a case-by-case basis determined by balancing three factors: 1) Does it serve the customer first (including internal customers), 2) is it supportive of the associate, and 3) can the job be done just as effectively virtually and/or off-site? Based on the insights from the IMC case, we provide three recommendations for organizations grappling with their return-to-work policies under the new realities of a post-pandemic workplace and the need to attract and retain associates.

1. Use the Digital-Physical Intensity Framework to Classify Virtual, Hybrid and On-Site Work Activities

Managing a post-pandemic blended workforce (i.e., one that includes virtual, hybrid and on-site workers) requires organizations to evaluate each employee's job with respect to the information and physical intensity of specific work activities and then determine if the activities require staff to be co-located at a specific site. Performance criteria will also need to be reevaluated, along with how performance will be measured. This evaluation can yield unexpected insights because the pandemic has upended some of the most basic assumptions about physical intensity, such as the need for co-location and in-person presence at meetings. At IMC, a new key performance metric emerged that had not been an issue pre-pandemic: worker availability. During the pandemic, not being able to reach associates in real time became a persistent frustration, especially at the intersection of on-site workers and virtual workers.

To help organizations carry out the evaluation of jobs, we have developed the digital-physical intensity framework (Figure 1). This framework is derived from the different work arrangements at IMC and the underlying drivers of how IMC was able to separate work from location. This framework recognizes that work activities have both physical and information-processing components; every work activity creates and uses information of some kind.[6]

The DPI framework is divided into four quadrants based on the information intensity of the work activity (low to high), and the physical intensity of the work activity (low to high). The information intensity is the ratio of time spent dealing with information (both information content and information processing) and the total time spent completing that activity.[7] The higher the information intensity, the greater the potential for digitization and the use of ICT to collect, process and disseminate information. Activities with high information intensity are strong candidates for virtual working because often they do not need to be performed by workers at the same place or at the same time. The physical intensity of work is the ratio of the time spent manipulating and processing physical objects and the total time completing that activity.

6 Saad, L., and Wigert, op. cit., October 13, 2021.

7 Mithas, S. and Whitaker, J. "Is the World Flat or Spiky? Information Intensity, Skills, and Global Service Disaggregation," Information Systems Research (18:3), September 1, 2007, pp. 237-259.

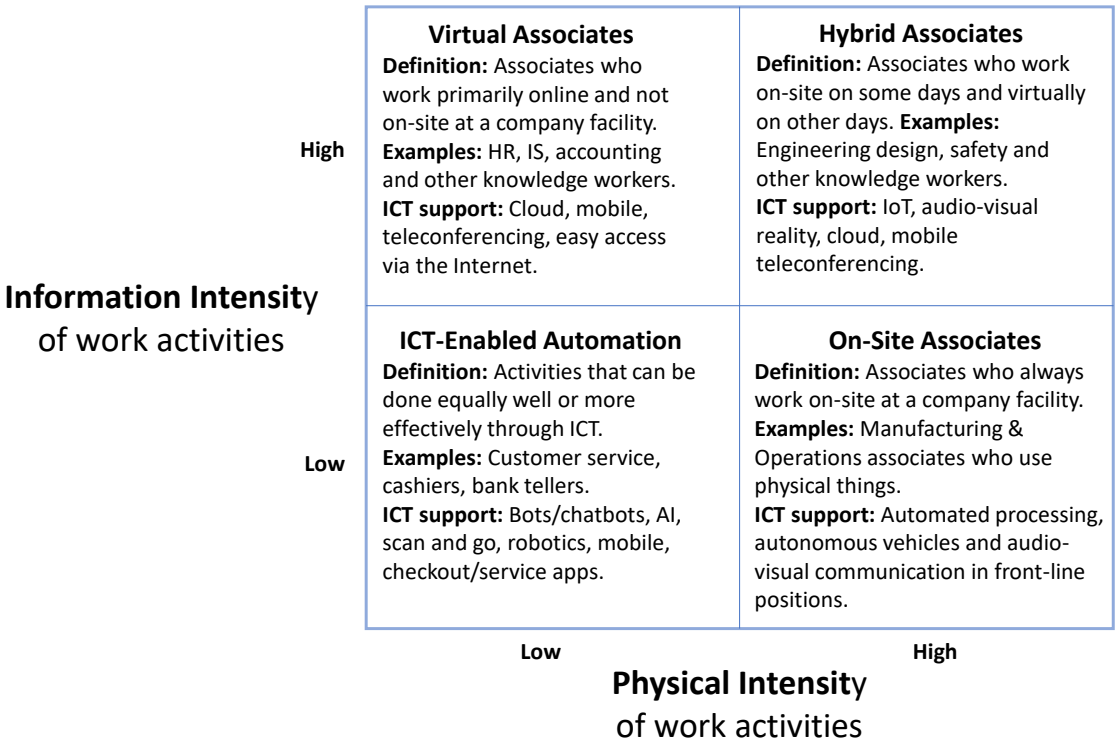
Table 1: IMC's Functional Areas, Information and Physical Intensity of Work Activities, and Changes to Its ICT Resources, Work Processes and Values Over Time

		Information Services and Administrative Support	Manufacturing & Operations	Engineering & Design	Sales & Marketing
	IMC Job Tasks	HR, Accounting, Information Services	Production Distribution Quality Control	Engineers Truck design and customization	Direct Sales
	Information Intensity	High	Low	High	High
	Physical Intensity	Low	High	High	Moderate
ICT Resources	**Pre-Pandemic**	File storage and exchange Email	ERP	On-location ICT access	Phones
	During the Pandemic	Cloud Mobile Teleconference	On-location ICT access	Mobile—Visual IoT	Social media Online sales
	Post-Pandemic Blended Workforce	Virtual knowledge worker	Automation On-site mobile	Expand IoT Augmented/ virtual reality	Social media engagement
Work Processes	**Pre-Pandemic**	On-site	On-site	On-site	Remote
	During the Pandemic	Virtual	On-site	Hybrid	Remote
	Post-Pandemic Blended Workforce	Flexible	On-site with greater schedule flexibility	Set schedules to have on-site coverage	Remote
Perceived Values	**Pre-Pandemic**		Highest priority		
	During the Pandemic	Highest priority	Lowest priority		
	Post-Pandemic Blended Workforce	Gain in priority	Loss in priority	Gain in priority	Gain in priority

Three of the four quadrants in the DPI framework are based on the descriptions of the three groups identified in the IMC case (virtual, hybrid and on-site) and list the essential ICT resources used by IMC during the pandemic. The fourth quadrant (low information intensity and low physical intensity), which we have labeled "ICT-enabled automation," did not feature in the IMC case. Work activities falling into this quadrant have been or have the potential to be completely automated by technology. For example, bots, chatbots, scan and go and self-checkout systems have replaced humans for simple customer engagement tasks. We believe that the DPI framework provides a valid, transparent, easily understood and simple basis for identifying work activities that can be done virtually and effectively.

We recommend that executives clearly define the different categories of working arrangements and provide clear guidelines for evaluating which jobs fall into each category. These definitions and guidelines should be transparent, justifiable and understandable to all employees. A constant question from workers both during and post-pandemic is: "Why do I need to come in every day when so and so doesn't?" Organizations that establish clear guidelines for when virtual or

Figure 1: The Digital-Physical Intensity (DPI) Framework to Map Work Arrangements and ICT Applications



hybrid work is appropriate can alleviate some of the strain associated with deciding and explaining why some job positions are able to work virtually while others require a full-time on-site presence. For example, as well as categorizing workers as virtual, hybrid or on-site, IMC defined "remote" as off-site work activities with high physical intensity, such as technicians responsible for repairing trucks in the field—this is co-located work, but not at an IMC facility.

It is worth noting that IMC decided that only one job category would be fully virtual going forward: IS programing positions. This decision was based on an objective evaluation of the job requirement: 1) IS programmers write and modify code so there is low physical intensity, 2) programmers found a way to leverage ICT to replace the chatter and ad hoc conversations of an on-site setting, 3) virtual working does not impact programmer productivity, and 4) this categorization aligned with IMC's values of supporting associates—programmers have an expectation of being able to work virtually.

2. Challenge Assumptions About Co-Locating Workers, Focusing Instead on Business Needs and Organizational Values

Decisions on where and how work is performed in the future should be driven by business needs and organizational values, not pre-pandemic assumptions about the importance of co-locating workers or maintaining abnormal conditions of crisis response. At IMC, while a strong organizational culture that values commitment to the customer and its associates was essential for sustaining successful business operations during the pandemic, many workers felt that these values were either violated or not reciprocated, especially among workers who continued to work on-site. This resulted in the surprising finding that on-site workers, not virtual workers, felt that IMC had not lived up to its organizational value of supporting associates. This finding calls into question the assumptions that co-locating workers is necessary for building

a strong organizational culture and that virtual workers cannot develop a strong sense of identification with the organization and its values.

The IMC case shows that reinforcing corporate values may not be a valid reason for mandating that associates return to on-site working. This experience does not appear to be an isolated case. In the U.S., there is a nationwide surge in resignations and unionization, driven primarily by workers in jobs with high physical intensity that continued working on-site throughout the pandemic.[8] There has long been tension between white-collar workers performing high-information-intensity jobs and blue-collar workers performing high-physical-intensity jobs. However, the benefits for white-collar workers who worked virtually during the pandemic may, this time around, be especially difficult to accept by workers in manufacturing, hospitality, healthcare, retail and other jobs that are tied to specific locations.

Organizations therefore need to overcome the perception that on-site workers feel they are "losers" in the new post-pandemic normal. Workers in high-physical-intensity/low-information-intensity jobs are essential to successful business operations and were considered "heroes" during the pandemic. During the pandemic, these workers were operating in conditions that isolated them from their virtual and hybrid colleagues. This led to feelings of losing touch with co-workers and not being able to share knowledge as easily.

Organizations should also consider the extra costs for co-located workers, such as the costs of living in close proximity to work sites and the time and expense of commuting. A blended workforce, by definition, results in the stratification of workers, and organizations should invest in human resources and ICT that support knowledge-sharing activities, continued training and relationship building. Organizations must find new approaches to building community among all workers to avoid the negative consequences of working in isolation.

Companies such as Apple may be able to continue with a virtual work policy because the majority of workers are white collar and so everyone can work virtually. However, for companies like Tesla and IMC, where many jobs have high physical intensity, the potential negative impact on co-located employees' morale makes it a much more difficult decision, because there is a perception that virtual workers receive additional benefits not available to on-site employees. Companies that rely on workers in high physical-intensity jobs need to find ways to make on-site workers feel valued. One way of countering this perception is to bring administrative and support workers back on-site. Another approach is to provide on-site workers with additional benefits of time, flexibility and compensation to reduce the real and perceived costs of coming to work.

IMC chose to bring support associates permanently back on-site because of its customer-first commitment. The on-site, frontline associates performing the primary activities add the greatest value to the customer, and associates in support functions that directly interface with frontline associates need to be on-site to provide them with the best service.

Another factor to consider is that empty offices and closed doors provide a visual reminder to those coming to work that they are being treated differently from their hybrid and virtual colleagues. Another strategy for organizations with a blended workforce would be to designate work arrangements by specific work site/location (e.g., all associates assigned to that location work on-site) rather than using the DPI framework to make decisions. For example, IMC is exploring ways to repurpose workspaces in its production facilities previously occupied by the now virtual IS Services associates to provide expanded areas for manufacturing and distribution, thus eliminating empty office spaces by repurposing them for use by on-site workers.

3. Provide Greater Worker Flexibility While Maintaining Professional Standards

For IMC's support associates, one of the greatest benefits of working virtually is the increased flexibility in their daily routines. These associates identified two types of flexibility. The first is being able to determine working hours, such as starting earlier and then taking breaks

8 See, for example, *Starbucks Workers Drive Nationwide Surge in Union Organizing*, NPR, May 1, 2022, available at: https://www.npr.org/2022/05/01/1095477792/union-election-labor-starbucks-workers-food-service-representation.

mid-morning and early afternoon to spend time with kids, and then working later in the evening. The second type of flexibility is the ability to work virtually when it makes sense to do so, such as spending all day in Zoom meetings with colleagues at different IMC locations or focusing on finishing a report. IMC addressed the issue of flexibility for on-site support associates by introducing a new process that enables associates to enter a request for a virtual day, provide justification and details about the work to be done, and have the request approved by the associate's manager.

Allowing this flexibility requires establishing a new set of virtual work standards and routines. At IMC, this included creating a dress code to be followed during working hours (business attire top and bottom), mandating that cameras are always on while attending virtual meetings and requiring that virtual work is done in a quiet, office-like location (not in bedrooms or lying down on the couch) and without distractions (children must be at school or daycare).

However, IMC found that associates were often requesting virtual work days when there were personal tasks to be done at home, such as meeting an electrician for home repairs or when kids were out of school. As a consequence, IMC decided to deny these types of requests because the personal tasks would require time away from work. Instead, IMC established three additional personal days for all associates, regardless of work arrangement, to accommodate these types of situations. To provide greater flexibility for all associates, IMC is also looking at ways to increase flexibility for on-site workers by being more open to alternative scheduling strategies, which had previously never even been considered an option.

It is also important to communicate to employees that working remotely or virtually does not mean being isolated from colleagues. Staying connected to professional peers is essential regardless of where work gets done. IMC has therefore established work practices to support real-time availability using chat and the "status" feature on Microsoft Teams. These practices have even resulted in new language like: "Can't they see I'm a red dot—why are they texting me?"

IMC's programmers developed the practice of morning check-ins using Teams, and then leaving the Teams meeting open all day for ad hoc communications as issues arise, essentially replicating the cubicle work experience they had before of "shouting over the wall." Remote working salespeople and traveling technicians rely heavily on mobile devices with chat and video to "bring someone here" when they encounter problems beyond their expertise and need to seek advice and input in real time as issues arise. Finally, the availability of more ICT support within IMC's production facilities enables greater communications between frontline and support workers, even if they are co-located.

Concluding Comments

The digital-physical intensity framework and the recommendations derived from our analysis of the IMC case provide a way of thinking about the management of blended work arrangements, especially for organizations grounded in physical operations. In this article, we have shown that business processes and work activities vary in information and physical intensity, and that employees will not accept a one-size-fits-all approach to managing work arrangements. Executives will need to challenge long-held assumptions about the value of co-locating employees for developing corporate values and organizational commitment, especially as virtual and remote workers have demonstrated that the use of ICT often results in better communication, greater flexibility and increased productivity. The IMC case shows that employees in a blended workforce will experiment and develop new ways to leverage ICT investments to create stronger connections with colleagues across the organization and better support customers. However, managing a blended workforce requires executives to implement compensation strategies that address the higher costs incurred by employees required to work on-site and provide them with benefits that increase their flexibility, thus fostering a greater sense of equity with their virtual and hybrid colleagues and their commitment to the organization and its values.

Appendix A: Research Methodology

The IMC case is an outcome of a corporate MBA class focused on IT and

digital transformation that was offered to IMC associates in the fall of 2021. First, we performed preliminary interviews with key company informants and reviewed publicly available corporate documents to ensure that this company would be a strong candidate for the study. There were 73 students in the course, including associates from all functional areas and 15 different geographic locations. Over the seven-week course, associates shared insights about IT and IMC's response to the COVID-19 pandemic, including information shared through discussions, assignments, interviews and several dozen informal conversations. It was clear from the class that associates' firsthand experiences during the pandemic varied drastically based on what functional unit they worked in. Investments in IT prior to the pandemic were helpful to some functional units but actually increased stress and pressure on other areas of the organization. To better understand these dynamics, the primary source of data for this case was generated via a survey.

Of the 73 IMC associates enrolled in the course, 42 agreed to participate in a survey designed specifically to examine the interplay between investments in IT resources, work processes, corporate values and IMC's pandemic response. Associates were asked to rate the use of technology pre-pandemic, during the pandemic and post-pandemic, using the list of the digital technologies most associated with digital transformation.[9] Associates were then asked to rate the extent to which investments in digital technologies pre-COVID had a positive/negative impact on business operations in their unit, focusing on the unit's resources, processes, values and performance, and how the adoption of these technologies will impact the future of work in their unit. The survey also included open-ended comments to collect IMC associates' stories about the specific impacts of digital technologies and the pandemic not only on the associates' work but also on other value activities and linkages. Key findings from the survey are summarized in the charts and table above.

Survey respondents were also asked to rate the extent (1 = *no extent* to 6 = *a very large extent*) of their use of the list of technologies in their work area/functional unit pre-pandemic and in the future (see table below).

Finally, we combined the survey data with in-depth interview data to provide validation of the results and identify areas in need of further investigation. The results were presented to IMC associates and leadership at a "lunch and learn" event, where corrections in understanding and new insights were gained. Earlier drafts of this article were reviewed by key IMC informants to ensure accuracy and that we had adequately captured insights. To date, we have collected data from more than 60 internal organizational stakeholders and data collection is ongoing.

Appendix B: Selected Quotes from IMC Associates

In addition to the quotes included in the main body of this article, the following quotes arose during discussions about IMC as a company, the role of ICT, pre-pandemic working arrangements, the response to the pandemic and the new post-pandemic blended workforce.

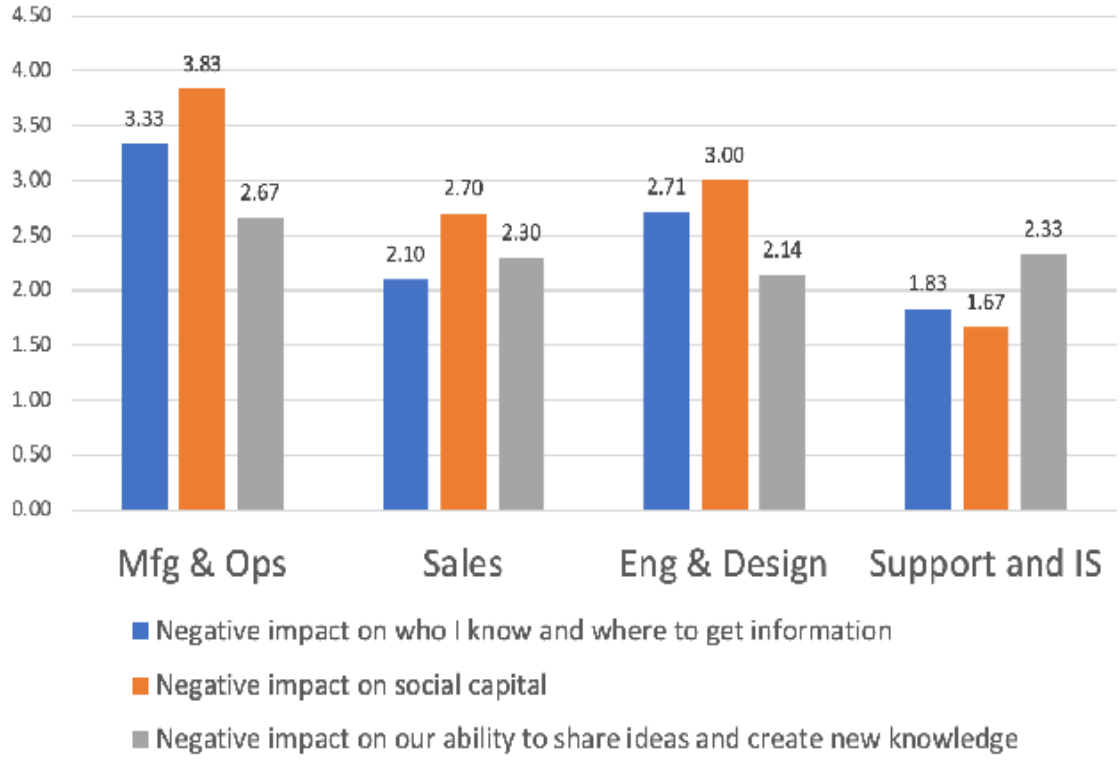
IMC as a Company

> *"One of our best-selling features of the company is that we are a one-stop shop. We can take your truck in on trade and auction it off, sell you a new truck, sell you a used truck, finance your truck and service your truck. This allows us to tell customers that we can handle anything they throw at us."* Technical Sales Representative

> *"We design all our trucks in a 3D environment before production. This allows us to show the customer exactly what they will receive, take measurements and make changes without affecting our production line. This has resulted in fewer changes to the physical truck and less time to produce a truck. Our customers are also happy to receive a truck that is exactly as expected in less time."* Engineering & Design Associate

9 The list of technologies associated with digital transformation mirrored those in *Digital Transformation: Bridging the Gap between Expectations and Outcomes* (Pulse Survey Report Sponsored by EXL), Harvard Business Review Analytic Services, May 24, 2018.

For your specific work area/functional unit, to what extent did the COVID pandemic have an impact? (1= strongly disagree; 5 = strongly agree)



Rapid Work Changes in Response to COVID-19

"I was asked to work remotely for about a month. I came back to work with desks moved to accommodate social distancing and face masks being required at all times." Manufacturing & Operations Associate

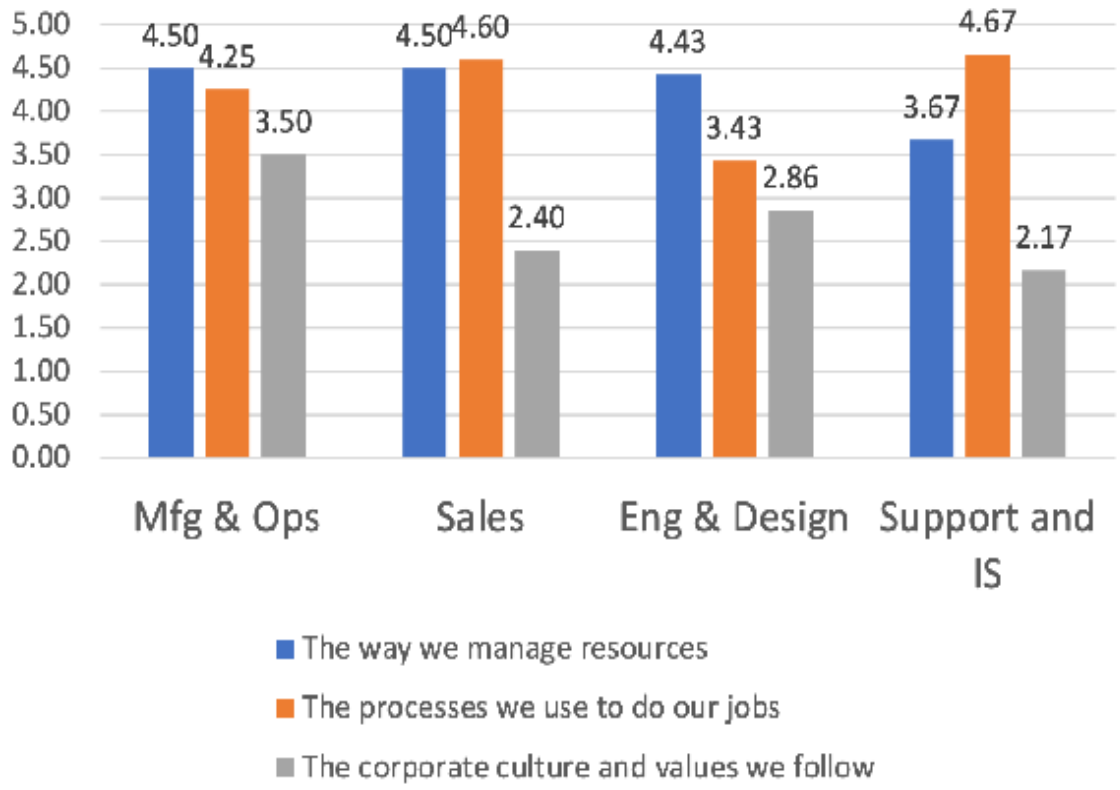
"Mid-March [2020] we were given direction to stay out and abide [by] my [own] state and federal guidelines. [IMC] provided a list of protocols as recommended by CDC. We were only allowed to visit customers in 'emergency' situations such as product demos and in-services (which familiarized operators with our products after final delivery). We were required to obtain approval for travel from senior leadership. Prior to COVID we were largely autonomous and could make our own schedules." Sales & Marketing Associate

"We were sent home initially. Most of the team worked remote for a few weeks then we transitioned to half the team onsite while the other worked offsite. These groups would rotate every week. After a few months we came back full time but were split between multiple conference rooms and offices in order to social distance." Engineering & Design Associate

Role of Office 365 in IMC's Response to the Pandemic

"... as a company, we transitioned to Microsoft Office 365 in September 2019. Timing could not have been better as it allowed us to use Microsoft Teams for meetings, calls and customer interaction while remaining distant with less travel." Sales & Marketing Associate

For your specific work area/functional unit, to what extent did the COVID pandemic have an impact? (1= strongly disagree; 5 = strongly agree)



Remote Working

"The network speeds, specifically VPN speeds, when working remote are still a struggle at time[s] and can make working remotely a little clunky." Administrative Support Associate

"Initially our VPN was very slow and made it challenging to work remotely. We now have Cisco Meraki boxes at home that has fixed that issue." Administrative Support Manager

"When news about the pandemic started, we were warned that we may have to work remotely. It started with us taking our laptops home every night. A call came in over the weekend directing that we come to the office and gather all items needed to work remotely. This meant printers, scanners and any office supplies. This lasted for 18 months." Administrative Support Associate

When Being in a Place Mattered, but One Person Was Remote

"Being able to access the same digital displays [as those on the manufacturing] floor ... was critical [for problem solving]. [Microsoft] Teams and the Office [365] programs allowed the team to work together and communicate effectively on similar problems when we were separate" Manufacturing & Operations Associate

	(1) Pre-Pandemic	(2) Future
Cloud Applications	4.26	5.47
Mobile Applications	4.05	5.28
Advanced Analytics	3.19	4.45
Virtual Knowledge Worker	2.77	4.44
Internet of Things	3.33	4.43
Social Media Engagement	2.56	3.88
Big Data Architecture	2.67	3.73
Augmented/Virtual Reality	1.95	3.71
Artificial Intelligence	1.86	3.26
Computer Cognition: Interaction/Reasoning	2.70	3.19
Intelligent Processing Automation	2.00	3.05
Omni Channel Engagement	2.16	2.93
Machine Learning	2.14	2.91
Robotic Process Automation	1.93	2.83
Chatbots	1.91	2.76
Blockchain	1.67	2.26

About the Authors

Molly Wasko

Molly Wasko (mwasko@uab.edu) is a University Professor at the University of Alabama at Birmingham (UAB) Collat School of Business. She conducts research that addresses the challenges of digital transformation, innovation and entrepreneurship, with a specific interest in the intersection of technology and strategy. As a successful academic entrepreneur, she also has a passion for supporting research commercialization and is the director of UAB's National Science Foundation and National Institute of Health I-Corps programs, as well as an I-Corps National Instructor. Molly's Ph.D. in Management Information Systems was awarded by the University of Maryland, College Park.

Alissa Dickey

Alissa Dickey (alissadickey@unm.edu) is a professor of practice at the University of New Mexico Anderson School of Management in Albuquerque, New Mexico. She conducts research that explores the intersection of people, processes and technology, with specific interests in innovation, collaboration and the nature of work. She also draws on both entrepreneurial and Fortune 500 experience to inform research in various areas of healthcare and digital medicine. Alissa has a Ph.D. in management information systems awarded by Louisiana State University.

