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Digital Mindsets: Recognizing and Leveraging Individual Beliefs for Digital Transformation

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In this paper, we propose that employees' beliefs about personal and situational resources in the context of technological change, what we refer to as *digital mindsets*, are likely to influence employees' engagement in (or withdrawal from) digital transformation initiatives. We expect that employees' beliefs regarding the malleability of personal ability (fixed/growth mindset) and their beliefs about the availability of situational resources (zero-/expandable-sum mindset), in combination, influence the extent to which employees see new technologies as providing opportunities and resources for professional growth, or encroaching on their ability to display competency and retain resources. Implications for managing digital transformation are discussed.

Increasing managerial attention is paid to the "fourth industrial revolution,"[1] fueled by the widespread application of digital information and communication technologies, that is fundamentally changing the nature and context of work[2]. Advances in, and the growing availability of, digital solutions means that most organizations now employ some form of digital technology, and many are actively working to introduce and leverage new technologies in strategic and prioritized ways. Organizations introduce new technology in an effort to make efficiency gains by, for instance, digitalizing resources, or increasing the effectiveness in communication and team-based working. However, there is a growing movement towards "digital transformation" in organizations, which is concerned with making major improvements in digital technology to enable the transformation of customer experiences, operational processes, and, ultimately, a company's business model[3].

The push towards digital transformation is motivated by the belief that new technologies have great potential to drive innovation and competitive advantage. Yet, the difference between digital transformation initiatives and smaller scale initiatives aimed at increasing efficiency and effectiveness are often not fully considered by management. This potential neglect could undermine the success of realizing digital transformation. Digital transformation, such as shifting from physical retail sales to a digital marketplace, is a much wider, deeper, and larger form of technological change[4] than more ordinary change initiatives, such as switching service providers for internal communication. Digital transformation involves multiple ongoing initiatives involving many interrelated actors, making it a more abstract form of change with an unforeseeable future that is more often explained by metaphor[5] than a literal description. This ambiguity makes it more difficult to structure digital transformation, and more difficult to implement from the top-down[6]. Accordingly, while the success of new technology initiatives has long been held as dependent on employees' acceptance and adoption of the new technology[7], which is largely aided by management's

ability to implement these initiatives and mandate usage, the success of digital transformation

initiatives is dependent on employees' voluntary and active efforts to engage in a much larger

and complex change process[8]. Organizations that understand what facilitates employee

engagement in this process and how to cultivate the conditions that give rise to this

engagement will be more successful with digital transformation than those that do not.

Scholars and practitioners concerned with the challenges of digital transformation

emphasize that employees, not only technology, are critical to the success of these initiatives[9].

Yet, the majority of research available on the topic is founded on traditional, top-down

models emphasizing employees' technology acceptance and adoption based on their beliefs

about technological attributes (e.g., ease-of-use, usefulness). Less research has addressed why

and how employees voluntarily and actively engage in the digital transformation process, with

its characteristic ambiguity that makes assessing technological attributes difficult, or

conversely, why and how employees may actively avoid or withdraw from this process.

We seek to address this gap in our paper by looking closer at employees' general

belief systems and postulating how they are used as sensemaking guidelines for understanding

digital transformation[10], which in turn influences behavior. Our research is based in social

cognition research (e.g., Bodenhausen & Wyer, 1985; Macrae, Milne, & Bodenhausen,

1994)[11], which shows that people rely on simplifying strategies when faced with increasing

complexity and uncertainty in their environment, and that general beliefs will represent a

more efficient cognitive processing strategy in these contexts (Milkman, Akinola, & Chugh,

2012)[12]. Using this as a springboard, we argue that people's general beliefs about the nature

of resources available within themselves and the nature of situational resources available

within in their context of digital transformation will create variance in the way they make

sense of and engage in (or withdraw from) digital transformation initiatives. We refer to the

combination of these beliefs as an employee's "digital mindset" and argue that leading digital

transformation will require leveraging the diversity of digital mindsets in one's organization, which will vary between individuals and over time.

Taken together, our paper proposes a person-centric approach that emphasizes the role that general beliefs, or mindsets, play in influencing how individuals make sense of and engage in (or withdraw from) more complex and ambiguous forms of technological change. In doing so, we contribute a socio-cognitive perspective to research on digital transformation that encourages future empirical study and helps managers and employees identify, reflect on, and develop their own digital mindset beliefs, which can assist them in better navigating and crafting their roles and careers in the digital era.

What are digital mindsets and why are they important?

Strategy consultants and industry experts argue that having a digital mindset is important in digitized workplaces[13]. However, the term "digital mindset" is often only used as a buzzword, or metaphor, in this context, and seen as one dimensional and normatively positive. When pressed to describe what having a digital mindset truly means, organizational capabilities such as the ability to fail, to test new ideas, or to be agile and collaborative arise[14]. Other experts relate digital mindset to having organizational structures and processes in place that support collaboration, innovation, knowledge sharing, continual improvement, agility, flexibility, and not least, perceptions among employees that digital technology is a strategic pillar of the organization[15]. Thus, having a digital mindset is equivalent to having an organizational climate or culture that emphasizes the importance of, and supports, digital transformation. The variety of mindsets that can exist at the individual-level and both contribute to and counter, a shared understanding of what is strategically important in the organization, is often overlooked in these accounts of digital mindset.

Having a strong, shared mindset can be important at the organization level for aligning employee behavior with the organization's vision and goals regarding digital transformation.

However, how digital mindsets vary between individuals and over time is also important to the success of a digital transformation initiative. The focus of our paper is on the digital mindsets held by individuals. In presenting these ideas, we contribute to a deeper understanding of what digital mindset means and its importance for digital transformation.

The digital mindset concept we propose is based on two general, individually-held beliefs. The first belief is self-oriented and reflects individual beliefs about the extent to which one's personal ability to learn and use new technologies is fixed or malleable. The second belief is situation-oriented and reflects beliefs about the extent to which the context of technological change is comprised of finite resources that must be competed for, versus expandable resources in which all parties have the opportunity to gain. Our interest in these belief systems is founded on social cognition research showing that people tend to rely on general beliefs when making judgments and taking action in specific situations[16], particularly when this represents a more efficient cognitive processing strategy than thoroughly analyzing situational attributes[17]. Given the complexity and ambiguity of digital transformation, identifying and analyzing the attributes of these initiatives would be difficult. Accordingly, the general beliefs an employee holds about personal and situational resources should be important for their information processing and change responses in this context.

In the sections that follow, we draw from the research on implicit theories of the self[18] and zero-sum situations and success construal[19] to elaborate the two general beliefs that comprise a digital mindset. Further, we look at how the combination of different beliefs constitute different digital mindsets that are expected to influence employees' perceptions of and responses toward digital transformation in different ways. In our description and analysis of these general beliefs, we do not specify whether they are accurate or inaccurate, but rather how these beliefs and their interactions could influence employees' perceptions of and responses to digital transformation. We move forward with the assumption that sometimes

these beliefs are well reflected. That is, sometimes they are accurate. However, occasionally these beliefs are incorrect and biased, mostly due to information deficiencies. While considering the contingencies that accurate versus inaccurate beliefs could have for behavior in the context of digital transformation is outside the scope of the present research, we suggest future research and managerial practices to go about these potential biases in our discussion.

Our description of the general beliefs as they relate to digital transformation are illustrated with narratives collected from employees experiencing new technologies at work. These narratives were captured in an inquiry made on Amazon's Mechanical Turk (MTurk) platform in early 2018, which resulted in 282 responses. For the purpose of this inquiry, we only invited individuals who had a full-time job outside of the platform. We asked participants to describe what new digital technologies their organizations have implemented in the past three years and how they feel about these changes. We further asked the participants to describe how the introduction of these new digital technologies in their organizations have changed the way they see or think about their jobs. Of the 282 participants, 85 (30.1%) were female and 197 (69.9%) were male. Their average age was 32.8 years old, while the oldest participant was 66 years old (N=1) and the youngest participants were 21 years old (N=2). The age distribution appeared to be relatively even across all age groups from 20s to 50s, with the exception of three participants who were in their 60s.

Digital Mindsets: General Beliefs about Personal and Situational Resources in the Context of Digital Transformation

General beliefs about personal resources: fixed versus growth

Carol Dweck uses the terms "fixed mindset" and "growth mindset" to refer to differences in individual beliefs about the malleability of basic personal resources like intelligence or ability that, in turn, result in different judgments and response patterns across tasks and situations[20]. In research on these beliefs, individuals are found to hold two different implicit theories about the nature of personal resources. Some endorse an entity theory, or

have a fixed mindset belief, reflected in views that intelligence, ability, or other basic attributes are fixed personal resources that cannot substantially be improved or changed over time or with experience. Others endorse an incremental theory, or have a growth mindset belief, perceiving intelligence, ability, and other basic attributes as malleable personal resources that can be increased or improved with sufficient effort and effective learning strategies.

In considering the resulting patterns of behavior, individuals with a fixed belief about their intelligence and ability tend to look for ways to validate their competence, and thus seek out situations where they can display their competence to others or avoid situations where they could look incompetent. Research indicates that individuals with fixed beliefs about their intelligence or ability are more likely to anticipate poor outcomes when the competencies required in the situations are out of their comfort zone and, as such, reduce effort or withdraw from situations when faced with obstacles or other challenges. According to this research, individuals with fixed beliefs consider that if they are truly competent or talented, then things will come easily to them. Thus, individuals with high fixed beliefs may give up more quickly when they have to learn new skills and are confronted with obstacles or challenges (reflected in their own poor performance), because they believe that if they are not good at something right away, they may never be. Further, they are more likely to turn away help when it is available, and less likely to proactively seek out help, because they fear being labeled as incompetent.

On the other hand, individuals who have growth-oriented beliefs about intelligence and ability display a tendency to look for ways to increase their competence, and thus seek out situations where they can learn and grow. They are more likely to gain confidence in the face of challenge and difficulty because they believe they are learning and improving as a result of this effort. Indeed, effort is viewed as a necessary investment to master something new, which

we consider a profound element in the face of digital transformation, where new skills or new work routines are often required. Thus, individuals with growth-oriented beliefs are likely to persist more adaptively when faced with obstacles or other challenges. They are also more likely to seek out and accept help and other feedback in this process, as they construe this information as helpful for attaining their learning goals.

Learning to use new technologies takes time and effort, and technological changes at work often results in roles that are inherently more complex, require greater cognitive skill, and continuous learning (Economist, 2017)[21]. We therefore expect that beliefs about the malleability of ability, particularly as it concerns an employee's beliefs about their technological ability, is relevant in the context of digital transformation. We believe that employees will both assess their relevant technological skills and have a belief about the malleability of their abilities when encountering these initiatives, which in turn could affect how they respond to and engage in the change needed.

Indeed, our MTurk inquiry generated several narratives from individuals who described technological changes in ways consistent with fixed and growth mindset beliefs. For example, a retail supervisor (female, 32 years old, high school graduate) described feeling "worried" when a new register system was introduced because it was something that she would have to learn and show her team. In this case, having a fixed belief is reflected both in her apprehension about the requirement to learn a new system and in the requirement that she would need to present it to others – a situation where she might risk looking incompetent. Similarly, another survey participant (female, 22 years old, some college) wrote that even though a new system with improved formatting had been introduced in her workplace, she "still prefer[red] to use the original one. Possibly because it feels so familiar." She went on to write that she was thankful that using the new system was optional, because she was then able to modify her work to her preferences by avoiding switching to the new system. This

testimonial reflects the tendency of individuals with fixed beliefs about their abilities to prefer performing in ways that they know and feel competent with, and avoid engaging in activities where they are insecure about their ability – even if exposing themselves to this activity could help them learn and perform it more adeptly.

Reflecting growth mindset beliefs, an IT middle manager (male, 32 years old, Bachelor's degree) in our MTurk inquiry stated, "I have tried to learn the new digital modifications so that I can understand and be up to date about all the latest technology." Similarly, a media publishing editor (female, 32 years old, Bachelor's degree) claimed, "I try to embrace new technology instead of avoiding it. In the short term, learning new systems or patterns may slow my productivity for up to a week, but usually once I master it, it makes my work easier."

General beliefs about situational resources: zero-sum versus expandable-sum

Zero-sum and expandable-sum beliefs are derived from game theory[22] and research on people's choices to either cooperate or compete when outcomes are interdependent, and the resources are limited. People often believe that an interdependent situation is either one of limited resources or expandable resources. In zero-sum situations, resources are finite such that gains by one party correspond with losses for others (i.e., zero-sum), whereas in other situations resources can be increased, such that gains are possible for all parties involved (i.e., expandable-sum). In line with this research, a zero-sum belief construal refers to general, individual beliefs that a situation is comprised of restricted resources, such that a resource gain for some implies a corresponding resource loss for others[23]. An expandable-sum belief on the other hand, reflects general beliefs that the resources in a given situation are expandable, and thus there exists opportunities for all parties involved in these situations to gain, therefore reducing the need to compete.

Organizations can be characterized as a multitude of interdependencies with resources

that are under constant negotiation. Thus, organizations have been a natural setting to study how individuals perceive situational resources and the different attitudes and behaviors that result from viewing these resources as finite versus expandable. We have evidence from research on negotiation in organizations that people often perceive situations incorrectly and a common bias involves a party believing that the situation is zero-sum, even when it is not. This assumption can be problematic, as having a zero-sum bias can lead to faulty information processing about the situation, more competitive behavior, and poorer joint outcomes. Zero-sum construal theory has been applied to other management research. In a recent study of helping behavior in organizations, Nina Sirola and Marko Pitesa[24] found that employees having zero-sum construal reported helping coworkers less and behaved more competitively towards coworkers – even when the actual situation was not objectively zero-sum. Thus, when a person perceives that a situation is comprised of finite resources and that there is a salient competitor for these resources, it can lead to negative attitudes towards the competitor and attempts to avoid them or hinder their ability to make gains in the situation[25]. On the other hand, when employees conceptualize the situational resources as expandable, they are less likely to perceive others as being relevant competitors and thus more likely to help others and engage in problem solving and cooperative strategies that seek out more favorable joint outcomes.

Technological progress changes the very nature of work. It can eliminate many forms of work and yet it can also create new occupations and jobs[26]. It is not surprising that individuals can have different views on technology development, some seeing it as 'the glass half full, and others seeing it as 'the glass half empty' if not entirely empty when faced with perceived digital threats. Accordingly, a person's views of technological change as presenting a zero-sum versus an expandable-sum situation are also likely to be important for how they perceive and respond to the magnitude of these new technologies. We therefore expect that

beliefs about the extent to which situational resources are restricted or expandable is relevant in the context of digital transformation.

Again, our MTurk inquiry generated several examples of individuals who described technological initiatives in ways consistent with a zero-sum belief. First, an operating system administrator (male, 35 years old, Bachelor's degree) wrote that he was worried about the technological changes being introduced in his organization – many of which concerned automation – as they could "take his job away." Similarly, a hospital security guard (male, 32 years old, some college) reported seeing his job differently after the implementation of certain patient-oriented service automations, such as putting iPads into patient rooms to make it easier for patients to interact with things like the TV, lighting, and thermostat. He wrote, "it's very possible that by the way technology is heading... there may not be any more need for us people... everything will be done by computers or robots." In another example, a restaurant manager (male, 42 years old, high school graduate wrote), "[new technology] increases profits for the business, but it also creates the need for less labor hours and I think this is a bad trend in the world for there being enough jobs to go around for everybody." In essence, the more technology that is introduced, the less there is for people to do, which creates less job security for employees. Thus, the context of technological change is viewed in finite terms, and new technology is identified as a salient competitor.

On the other hand, we also observed many comments reflecting these optimistic, expandable-sum beliefs. For example, a manager working for the federal government (male, 52 years old, and having a Master's degree) wrote, "I feel my organization is out on the leading edge, … and helping shape the direction in which some of these technologies will be adopted." A college resident advisor (female, 37 years old, with some college) wrote that she believed that by continually updating technological systems, her school was providing students and clients with the best services possible. A school librarian (female, 66 years old,

with a Master's degree) wrote "I love [technological change]! It is exciting and the technology is essential to prepare our students for the 21st century workplace…. I think that the more they use technology, the better prepared they will be." Finally, a building services employee (male, 27 years old, with some college) who was tasked with maintaining new Wi-Fi "hubs" that send promotional materials to customers in the retail store where he worked wrote that he actively embraced the changes because, "I think that it is an interesting change for the store and helps set us apart from others."

Digital mindsets: fixed/growth and zero-/expandable-sum beliefs

Reflecting on the theory and research outlined above, as well as the narratives received from our MTurk respondents, gives us the opportunity to put forward several predictions about the relationship between employees' general beliefs about personal and situational resources and their perceptions and responses to digital transformation initiatives. A digital mindset is held to comprise both fixed/growth and zero-sum/expandable-sum beliefs, and we are therefore, ultimately interested in how beliefs about personal and situational resources combine to predict different perceptions of, and responses to, digital transformation. In the section that follows, we consider four different configurations of fixed/growth and zero-sum/expandable-sum beliefs (Fig. 1) and the resulting perceptions and responses to digital transformation initiatives.

---- INSERT FIGURE 1 ABOUT HERE ----

Quadrant 1 – Fixed-zero-sum digital mindset: Competitive tactics and technology avoidance

Employees with both fixed and zero-sum beliefs about new technologies will have a tendency to view their world in finite terms, seeing their technological abilities as fixed, and view organizational resources as limited. The more abstract and complex the digital transformation is, this rather negative view of digital transformation can become more salient, especially when access to information is limited. As Hans Rosling's book *Factfulness*[27]

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explains, the human brain is hard-wired for this type of thinking. It is the product of evolution over millions of years, beginning when life was dangerous and resources were scarce. Even though we live in a very different world today, our brains have a difficult time seeking alternative information and letting go of this frame. In addition, from the research in negotiations, people tend to demonstrate the zero-sum bias when approaching a bargaining situation.

Digital transformation initiatives could be particularly threatening to people who have fixed and zero-sum digital mindsets when the initiative requires them to engage in activities where they feel they lack technological ability and/or in situations where competition is made salient. Employees who see their technological ability as fixed might be more doubtful and avoidant of engaging in digital transformation initiatives when they believe that they do not have ability required to perform well in this context. Fixed beliefs about one's technological ability will lead an individual to seek out situations where they can display their competence and perform well relative to others using existing technological tools or platforms, or at least avoid looking incompetent. For individuals with zero-sum beliefs, competing for resources will likely to be central in their thought processing. Zero-sum beliefs will frame the situation as presenting only win-lose outcomes and will encourage competitive "winner-take-all" behavior. Accordingly, we expect that the combination of fixed and zero-sum beliefs will generally result in individual, competitive "loss-minimizing" behavior that results in intentional avoidance of new technologies and withdrawal from the digital transformation initiative.

We also expect that people having fixed- zero-sum digital mindsets will undermine initiatives that threaten their current status and competence. Using the typological framework of resistance behaviors suggested by Carol Agócs[28], it is likely that people having dominant fixed-zero-sum digital mindsets may engage in denying the legitimacy of the digital

transformation initiative and why it is necessary. Based on this same framework, we propose that people having a fixed-zero-sum digital mindset could also be more likely to refuse to recognize the need for digital transformation and the existence of new technologies implemented under this initiative, or take actions to redefine their job responsibilities in a way that discredits new technologies or allows them to avoid interacting with them. For example, a food service crew member (female, 25 years old, high school graduate) from our MTurk inquiry discredits self-service kiosks in her restaurant by providing every customer she interacts with a "personalized and positive customer service experience." She does this in order "to remind people that a machine cannot replace hospitality." In this case, the employee has redefined her role from order-taker to customer experience ambassador – as this is something that the new technology is not able to provide, which discredits its effectiveness in the service industry.

Quadrant 2 – Fixed-expandable-sum digital mindset: Collaborative competence exploitation and technology freeriding

Individuals having a combination of fixed and expandable-sum digital mindsets will view their own ability to learn and develop new technological competence as limited, as described above. However, they should also be more open to see the opportunities presented by digital transformation initiatives launched at work. For example, they might be insecure about their own ability to learn and to use new technologies, while at the same time seeing the potential that new technologies have for their organization or their own way of working.

Accordingly, we propose that people having a fixed-expandable-sum digital mindset are likely to view technological ability as something that is fixed, but can be complementary, such that they could seek out ways of working with others who they believe have the necessary ability to use the new technologies[29]. For example, in our MTurk inquiry, a web developer (male, 36 years old, with a Bachelor's degree) referred to joining forces with a team

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member in order to integrate new technology at work, whereby the team member took responsibility for those aspects of work that the respondent did not feel as capable with.

Because people having a fixed/expandable-sum digital mindset are likely to be those whose abilities do not drive the digital transformation, we expect these employees to reorganize their task work so as to minimize their own interactions with the new technologies, or find ways to carry out their work requirements without using these technologies directly themselves. However, because they actively work with other employees with the relevant abilities, we expect them to become not only "technology free riders," but also technology cheerleaders. These people benefit from the opportunities and advantages presented by new technology while not engaging directly with it.

Quadrant 3 – Growth-zero-sum digital mindset: Competitive competence exploration and technology mastery

Because of their growth mindset, people in this quadrant are likely to believe in their ability to learn new technologies and to enjoy the challenges derived from technological innovation as they are presented the opportunity to learn and grow. We expect these individuals will be motivated by the challenge to learn something new and will be more proactive in putting in the effort and seeking out the resources needed to master new technologies and ways of working in the context of digital transformation.

However, having the combination of a zero-sum belief, these individuals are also likely to see that some people will benefit more, and some less, from digital transformation initiatives. We therefore argue that people with a growth-zero-sum digital mindset are likely to see situations of digital transformation not only as opportunities to grow, but also to win. Accordingly, we expect them to make changes in their jobs to secure their competitive advantage in this context, that is, to secure a winner position.

An example of this behavior is depicted in the biographical movie, "Hidden Figures,"[30] which tells of NASA's introduction of the IBM mainframe machine in the 1960's. The IBM

mainframe was set to replace mathematicians, or "human computers." For the human computer group, the situation was zero-sum: the IBM mainframe would take away their jobs. Dorothy Johnson Vaughan, however, embraced the new technology so that she could secure her job and improve her position at NASA. She taught herself the new programming language FORTRAN and went on to become the first African American female supervisor at NASA. Similarly, a respondent from our MTurk inquiry working in manufacturing (male, 39 years old, Bachelor's degree) stated that by taking the initiative to learn more about a new inventory management system, he gained a more secure position in the organization, and is now responsible for training other employees on how to use the system.

Drawing from this example, we propose that people with a growth-zero-sum digital mindset will make great efforts to learn all they can about new technologies and processes introduced in digital transformation initiatives, for example, by expanding the task boundaries of their jobs so that they can engage in challenging tasks that apply new technologies or activities that use new processes[31]. Moreover, they are likely to be more active in tracking their own competitive advantage as they gain experience with and master new skills. Exemplifying this, a hospital security guard (male, 32 years old, some college) from our MTurk sample described keeping detailed records of new job-relevant knowledge and skills that he developed over time, stating "my smartphone contains a long list of skills learned that I will never forget." These comments suggest a preoccupation not only with learning new technology, but also in documenting it – that is, collecting evidence that one has mastered this technology. We argue this is because documented evidence can later be used to secure a dominant position in a work context perceived as having limited resources. It is the focus on securing a dominant position in this context that likely drives growth-zero-sum digital mindset individuals to actively embrace digital transformation.

In protecting their competitive advantage, we also expect people having a growth-zero-

sum digital mindset to be reluctant to share their learning behavior or the knowledge they have acquired with others[32] - particularly perceived competitors in the organization. We expect, therefore, that these individuals will also change the relational boundaries of their work, such that they limit their interaction with perceived competitors as they are securing their competitive advantage. Once their competitive advantage is gained, however, they may use their skills and knowledge to help other employees become competent with the new technologies they have mastered. As stated by our manufacturing respondent above, once he gained a more secure position in the organization as a result of mastering a new technology, he took responsibility for training other employees on how to use the system.

Quadrant 4 – Growth-expandable-sum digital mindset: Collaborative competence exploration and technology socialization

People in this final quadrant are those who possess dominant growth and expandable-sum beliefs towards new technology. Given their growth-oriented beliefs, these individuals are likely to see themselves as having the capacity to learn and master new technology and may be more likely to seek out the challenges and resources needed to accomplish these goals. Given their expandable-sum beliefs, they will likely see the opportunities presented by digital transformation initiatives, as opposed to seeing only limitations and competition. Accordingly, we expect these individuals to be learning-oriented and optimistic in this context. As opposed to people having growth-zero-sum digital mindsets, we also expect the learning efforts of people having growth-expandable-sum digital mindset to be collaborative – as it is less likely that they will view coworkers as competitors in the situation. Because of this, we expect individuals in this quadrant to encourage and engage in a collaborative process when participating in digital transformation, such that it becomes a social experience entailing information and knowledge sharing, as well as problem solving. For example, a software developer from our MTurk inquiry (male, 26, Master's degree) recounted starting a

"WhatsApp" group for his coworkers to encourage an open discussion around the needs and problems associated with learning and using new technologies at work.

We further expect these individuals to take initiative to improve the functionality of the technologies and processes introduced with digital transformation initiatives, and teach others how to use and engage with them. Exemplifying this, another MTurk respondent (female, 27 years old, Master's degree, working in R&D), stated "I have embraced the new technology, and made some additional improvements to the way it is used. For example, it takes time to learn how to use the electronic lab journal. So, to allow others to be able to incorporate this technology better into their work, I dedicate a half hour to each new employee to show them how to use it. This sacrifice from my part will make the working situation for new employees a lot easier." Similarly, a respondent working in manufacturing (male, 39 years old, Bachelor's degree) stated, "I am responsible for teaching new and current employees about the proper way to utilize [the new] inventory system. I am constantly making changes in order to maximize the system's potential. I host daily classes to make sure that all employees are educated about the proper way to use this system." In all the examples shown here, we see how new technology introduced at work can give rise to bottom-up innovations via individual proactivity, knowledge sharing, and social learning.

Recognizing and Leveraging Different Digital Mindsets: Individual Roles and Managerial Implications

A primary purpose of this paper was to extend our understanding of how people's beliefs about personal and situational resources in the context of technological advancement and change could give rise to different digital mindsets, and how these digital mindsets could shape how employees make sense of and respond to digital transformation initiatives. As the success of digital transformation initiatives depends on employees' active engagement in the change process, we believe that understanding employees' digital mindsets is critical. We emphasize the development of this understanding because, based on the principles of social

cognition, people should have the tendency to rely on the general beliefs that comprise a digital mindset when making sense of, and deciding whether and how to respond to digital transformation initiatives, particularly because the complex and ambiguous nature of these initiatives makes an exhaustive scrutiny of their specific attributes both inefficient and difficult.

In the sections above we elaborated how the beliefs employees hold about personal and situational resources form the basis of their digital mindset, and in turn, influence the extent to which they can be expected to engage in, or perhaps withdraw from, digital transformation initiatives. In the section that follows, we specify the roles and implications for employees facing, or already involved in, digital transformation, and for managers of these employees. The paper ends with an action plan for leaders.

Implications and roles for individuals meeting digital transformation

In this paper, we argue that the extent to which an individual facing digital transformation in their organization—or in their entire industry—actively engages in or avoids this change initiative will be influenced by their general beliefs about personal and situational resources in the context of technological change. The different combinations of these beliefs, as reflected in the four types of digital mindsets, will be linked to different roles individuals take when meeting digital transformation, as depicted in Table 1.

Insert Table 1 about here

Our first recommendation to individuals in this context of digital transformation is to consider the implications of their digital mindset for how they engage with technology and other processes that are involved in making these changes. Individuals would benefit from becoming aware of their digital mindset and checking the veracity and basis of their beliefs.

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Such reflection would help them to challenge their own assessment of whether they can learn and use the new technologies being introduced, and to decide whether these technologies will take resources or provide new opportunities. After awareness of one's digital mindset, and questioning its accuracy, individuals then need to explore different courses of action depending on the type of digital mindset they have.

Individuals in quadrant 1 with the combination of fixed and zero-sum beliefs are likely to have a skeptical view of the changes introduced by the digital transformation, and fear being squeezed out of the organization, or having less opportunities to advance. These individuals could seek out a mentor, a role model, or a trusted change agent, who could help these individuals seek alternative information that may help them to assess the situation differently and *move* them into a new digital mindset. Alternatively, individuals with this mindset could evaluate other career options outside the organization or the industry and choose to leave. Individuals in quadrant 2, with a combination of fixed and expandable-sum beliefs, will likely see the benefits of technological initiatives for expanding career and work opportunities. However, these individuals will also likely evaluate that they themselves have limited abilities, and could actively seek collaborating partners within or outside the organization. Although they might not personally learn all the new technologies, they can be positive to new initiatives and contract in or join forces with others in the organization who have the digital skills. This mindset requires a role working actively with others.

In quadrant 3, individuals with growth-zero-sum digital mindsets have the option to use the competitive environment of limited resources to claim as much value as they can in the digital transformation. Individuals in this quadrant can use their skills and competencies to be leaders, the *star /master* in the digital change. Lastly, people who are in quadrant 4 with growth-expandable-sum digital mindset can be those who lead digital transformational initiatives with others. They can extend, promote, and create new opportunities, as well as be

the *transformers and change agents*. These individuals can collaborate with others to maintain and improve the digital transformation processes. Due to the situational assessment, competition is low and motivation for cooperation is high. These individuals are likely to seek to learn and grow and with digital transformation, and take the role of change agents. However, they should be conscious to choose who to work with and how to integrate the new technolgoies into new ways of working.

Implications and strategies for managers

We argue that employees' level of engagement in digital transformation initiatives depends on the social cognitive processes that they use to make sense of new information and make decisions in this context. Emphasizing the social nature of the process, it is important to identify that employees' general beliefs about technological change will likely be influenced by organizational actors constructing the digital transformation[33]. In particular, we expect that managers tasked with leading digital transformation will have substantial influence in this social cognitive process.

For example, managers' own digital mindsets can influence their employees' engagement in the change initiative. Linda Dragoni's[34] research draws from social learning theory to suggest that leaders who have a learning goal orientation, which is consistent with growth mindset beliefs, emphasize development and learning in their interactions with subordinates, which goes on to influence their subordinates' preferences for learning and mastery. Alternatively, leaders who have a performance goal orientation, which is more consistent with fixed mindset beliefs, go on to emphasize demonstrating ability or avoiding failure in their interactions with subordinates, which in turn instigates these preferences among their subordinates.

Similarly, Amy Edmondson finds that how leaders frame the context of new technology implementation – both in their communication and through their behavior – has

important implications for how employees perceive and respond to new technology[35]. Further, she finds that leaders who frame new technology implementation as an opportunity for learning are more successful in their implementation efforts. We expect this is because leaders who emphasize learning in the context of digital transformation activate beliefs among their employees that technological ability can be developed, i.e., growth mindset beliefs. Similarly, we also expect that, to the extent that a leader emphasizes competition between group members or restricts resource allocation, they can activate zero-sum beliefs among employees. On the other hand, if leaders emphasize the opportunities created by new technology, they can promote expandable-sum beliefs among subordinates.

Given that people's general beliefs about personal and situational resources can be influenced top-down, what should managers tasked with leading technological change be doing?

1. *Develop greater self-awareness about one's own digital mindset*

We argue that managers tasked with leading technological change need to assess their own fundamental beliefs about the changes they are leading and themselves facing. This advice aligns with a large body of research that has pointed to the importance of leaders' self-awareness for their leadership effectiveness[36]. Having self-awareness is an important step towards the success of implementing change, as it enables a better assessment of what is needed to deal with change situations most effectively[37]. In particular, self-awareness of one's own digital mindset is important when leading digital transformation, because the fundamental beliefs comprising these mindsets are likely to shape not only the explicit, but also the implicit messages that leaders send to employees about new technologies.

For example, in our MTurk inquiry, one health clinic manager (female, 56 years old, some college) described trying to "put on a happy face" and "talk up the new system" when teaching nurses how use the clinic's newly updated patient registry system. However, she also

admitted using "paper and pencil" systems that were easier for her in her own practice –
behavioral evidence of having fixed mindset beliefs towards this new technology. In another
example, a systems librarian (male, 47 years old, Master's degree) described how migration to
a new cloud-based system meant "less autonomy, less control, and even less access to our
own data" for himself and his colleagues – statements that signify a zero-sum belief.
However, as the project manager in charge of handling the migration and teaching the staff
how to use it, he had to try not to let his negative feelings about the system show too strongly.
"But," he stated, "it's no secret…. I have accepted our new system and even gave a couple of
presentations at the host company's annual conference, but deep down I still hate it."

Such a discrepancy between one's own beliefs about, and behaviors towards new
technologies and the beliefs and behaviors one is trying to instill in others is likely to create
problems for employees' engagement in digital transformation initiatives down the road. For
these managers, learning how to monitor their own fundamental beliefs, and understand how
these attitudes and behaviors influence others' perceptions and responses to digital
transformation, is as important as trying to evolve to be more open towards and acceptant of
digital changes.

2. *Personal and situational assessment, is it accurate?*

Similar to our recommendation to employees, managers should also critically assess their
general beliefs about personal and situational resources in the context of technological
change. This is particularly important because people in leadership positions have a greater
tendency to overestimate what they think they know than other employees in the organization.
Is the introduction of the new technolgoies a zero-sum situation within the organization and/or
the industry? Even if the digital transformation will eventually mean the loss of some jobs
(i.e., is objectively zero-sum), there can be possibilities for creating new jobs or opportunities
during the process. Further, when assessing their employees' current capabilities and potential

capabilities for learning the new technologies, managers should be creative and not restrict their assessments of employees to focus only on their current jobs. It is better to take a broad perspective and consider how an employee may be reskilled or upskilled to take on different jobs or roles in the organization.

3. *Frame the context in such a way that more positive digital mindsets will flourish*

With self- and other-awareness, managers can influence more positive digital mindsets in the organization by framing the situation to align with growth-oriented and expandable-sum beliefs. As discussed in this paper, the ways in which employees relate to digital changes are likely to vary depending on the assessment of their own competencies, as well as the perceived competition for resources in the situation. Accordingly, their responses to new digital technologies are likely to depend on the salience of questions, such as "Does digital transformation offer greater or less opportunities to advance my career?" or "Will it change how I work, or what I work on? If so, am I competent to take on these changes?" Employees' perceptions of competence and competition in this uncertain change process are likely to drive their subsequent responses both in terms of how they may make sense of technological changes, and how they may craft their jobs to embrace, avoid, or possibly undermine these changes. However, managers are in a key position to send signals to employees regarding the malleability of personal resources, or the expandability of situational ones, thus influencing perceptions of competence and collaborative learning environments.

4. *Develop the personal resources and provide the situational resources that enable positive digital mindsets*

Managers are also in a key position to develop the personal resources and provide the situational resources that will be essential for enabling more positive digital mindsets. For instance, in the Royal Bank of Scotland (RBS), as advances in data analytics took over core duties of its financial advisors, management created the new position of "journey manager" for advisors to take up a new format of customer service. Whereas the old financial advisor

position emphasized the sale of ad-hoc financial products, the new role focused on facilitating customers' journeys through their major financial moments with the help of data analytics. When the new role was first implemented, RBS management brought in specialists to help new journey managers better understand how data analytics could help them in their new role. Additionally, RBS management provided weekly communications and information on "lessons learned" to encourage a learning culture. Giles Richardson, RBS's Head of Analytics, expressed that providing these resources was important to bring everyone along in the change process. He said: "we were not forcing this behavior, we were enabling it."[38]. By creating the new journey manager positions and enabling employees to succeed in this new position, those leading the digital transformation at RBS sent a message to those affected by the digital changes that resources were expandable (i.e., new positions would be created) and that role incumbents could be confident in their ability to develop the competence needed to do well in this new position.

5. *Pay attention to, manage, and leverage the diversity of mindsets within the organization*

Next, how can managers better understand the different digital mindset combinations of their employees and best leverage them in the digital transformation initiative? Managing employees in Quadrant 1 could entail helping these employees find new jobs in the organization (or externally) or helping them to move towards a different digital mindset. Alternatively, managers could invite employees in this quadrant to join project teams where their more critical perspective and feedback could be valuable for improving processes and initiatives captured under the umbrella of the digital transformation. Employees in Quadrant 2 could be placed in teams or roles in which they can serve as bridge builders between the employees who actively approach new technology, on one side, and employees who actively avoid new technology on the other. Employees in Quadrant 3 could be put in charge of exploring and learning new technological developments, and then bringing this knowledge

back to the team after they have mastered the domain. When change agents are needed, individuals in Quadrant 4 can be good candidates to encourage collaboration and provide support for innovative ways in which the technolgoies can be used. Leaders could place them in positions as project leaders or learning managers in the implementation process.

6. *Think critically and seek to understand*

It is likely that other organizations could benefit from taking proactive actions similar to those at RBS in stimulating growth- and expandable-sum mindsets among their employees, particularly when digital transformations encroach on existing positions and roles, and require new skill sets to be developed in order to take on alternative positions and roles in the organization. However, it is also important for managers to understand that the different digital mindsets are not necessarily positive or negative. That is, having a growth and expandable-sum digital mindset may not always be the ideal configuration for every change – particularly those where resources are in fact finite, or where sufficient support is not available to help employees develop the competency needed to adapt. Similarly, social acceptance of new technologies without critical thinking, and spending resources to socially innovate on new technologies, may not necessarily bring about the intended benefits[39]. There are also potential work inefficiencies that could arise from having more "positive" forms of digital mindset, with their corresponding responses to technological change contributing to the complexity of the digital transformation process.

Accordingly, managers should rather pay attention to how different digital mindset configurations and accompanying behaviors may be triggered, and what the consequences of these mindset configurations could be. For example, extensive change resistance research indicates that non-compliance behaviors, which are often seen as irrational reactions towards the changes, can also be the product of rational consideration, and may bring attention to

critical aspects of the change[40]. Managers who view such reactions as irrational invalidate them and trigger negative feelings and behaviors among employees who may feel their opinions are not heard. A better approach would be for managers to try to understand the fundamental beliefs that underlie these reactions, and tailor their interactions with employees to best address these beliefs.

Conclusion

In this paper, we develop the concept of digital mindset to reflect employees' individually-held, general beliefs regarding personal and situational resources in the context of technological change. Specifically, we suggest that employees' beliefs regarding the extent to which their technological ability is fixed versus malleable (resulting in fixed or growth-oriented beliefs) and the extent to which they believe situational resources to be limited or expandable (resulting in zero- or expandable-sum beliefs), in combination, comprise their digital mindset. We draw from social cognition research to argue that the beliefs that comprise employees' digital mindset could be particularly important for making sense of and shaping their responses to digital transformation initiatives, which involve a high degree of complexity and ambiguity. Further, we elaborate how employees' digital mindset will go on to shape the extent to which they see digital transformation initiatives as providing opportunities and resources for professional growth, or encroaching on their ability to display competency and retain work resources, and how this, in turn, will influence the extent to which they engage in (or perhaps withdraw from) digital transformation initiatives. We illustrate our predictions with examples provided by employees and managers experiencing the technological change and uncertainty at work.

In presenting this work, we contribute to the development of a person-centric approach towards digital transformation engagement that can be applied for understanding employee attitudes and responses towards digital transformation initiatives. We also provide practical advice for both employees and managers so that they can better understand and leverage

digital mindsets in the technological change initiatives they face and lead, respectively.

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