FEATURE ARTICLES

Facing and Embracing the Fourth Industrial Revolution With Character

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ABSTRACT

The advent of the Fourth Industrial Revolution (Industry 4.0) in the early part of the 21st century produced internet-based connectivity of people and machines, cyber-physical systems, and mass customization of products and services. The rise of advanced information technology (AIT) such as social media, artificial intelligence, machine learning, robotic process automation, and drone delivery of products in this context has greatly changed the nature of leadership practice by redefining the functions and roles that AIT and people play in organizational operations. The introduction of "superjobs" that integrate a range of traditional jobs typically performed by people with AIT to produce efficiency and productivity gains has introduced complexity and threats to people's wellbeing. Despite this paradigm shift, calls for supporting the human condition have been made by business and military organizations. In response to these calls, we examine how research and practice on character strengths and their development can support the human condition and serve as benchmarks for re-inventing organizations well into the future. Specifically, we expand considerations of character strengths by framing them as a means to support design principles of Industry 4.0 organizations while enhancing the human condition through knowledge of oneself and others that leads to constructive engagement.

At the dawn of the 21st century, Pierre Schaeffer suggested that societies evolve materially as science progresses with its introduction of new technology and expanded understanding, whereas individuals remain fundamentally the same in their character due to the complexity of the human condition (Hodkinson, 2001). Social psychologists point out that industrial revolutions introduce a degree of dehumanization into society, and thus call for organizational designs with a greater human focus that address technology's threats to the psychological, social, community, and career well-being of individuals (Halsam, 2006). Such calls are consistent with recommendations recently made by an international consulting firm that suggest that human principles associated with character-based leadership principles could serve as benchmarks for organizational redesign programs needed in the Fourth Industrial Revolution (Industry 4.0). These benchmarks aim to design organizations as social enterprises that balance the goals of all stakeholders (Kaji, Hurley, Gangopadhyay, Bhat, & Kahn, 2019). They are consistent with initiatives by management consulting firms to support the "employee experience" from recruitment until departure (Pendell, 2018), and the United States Air Force's goal to help its cadets and airmen better understand the human condition by knowing self and others, and constructively engaging with them (USAF, n.d.).

The position we take in this article follows prior scholars (e.g., Born & Megone, 2019) who argued that notions of virtue and character drawn from ancient Western and Eastern philosophers are still quite relevant for leadership in the post-modern age, especially for organizations challenged with adapting to the situational demands of Industry 4.0. Specifically, we attempt to expand the consideration of the Values in Action(VIA)[1] classification of virtues and character strengths (Peterson & Seligman, 2004) by framing it as a means to support design principles of Industry 4.0 organizations while enhancing the human condition through knowledge of oneself and others that leads to constructive engagement. We do so because while Industry 4.0 makes advanced information technology

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1 Peterson and Seligman's (2004) Values In Action (VIA) framework groups 24 positive human character strengths into six broad virtue classifications of wisdom and knowledge, courage, humanity, justice, temperance, and transcendence. The VIA Inventory of Strengths (VIA-IS) is an assessment measure of these strengths that assists individuals in applying them to professional and personal situations in ways that demonstrate excellence.

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(AIT) more salient in leadership processes, it also places greater cognitive, affective, and moral demands on leaders and followers because they must substitute for the lack of such abilities by AIT currently being deployed. Consequently, as AIT changes the nature of leadership and vice versa in post-modern society (Avolio, Sosik, Kahai, & Baker, 2014), we suggest that the manifestations of specific character strengths and virtues through one's leadership behaviors that are consistent with human principles of social enterprises can promote success in the era of Industry 4.0.

We begin our discussion by first reviewing the nature of industrial revolutions, particularly Industry 4.0 and its projected human capital trends and their implications for post-modern organizations. Next, we highlight critical aspects of virtue and character in terms of some of the basic operational definitions prior research has used to understand their role in leadership processes. We then identify specific virtues and character strengths to support human principles for social enterprises which have been proposed as benchmarks for the redesign of post-modern organizations. Finally, we conclude with recommendations to guide future research and practice as they unfold in the era of Industry 4.0.

Industrial Revolutions

The word "revolution" is often used by scholars to evoke notions of radical change or development of individuals, groups, organizations, industries, nations or entire cultures. Such paradigm-shifts have occurred throughout human history, often initiated by transformational leadership processes involving inspiration of followers to pursue a meaningful vision, role modeling of ethical character, championing innovation, and mentoring followers. These progressive transitions are the outcomes of leaders and followers who interact in situations through cycles of events that unfold over time (Bass, 2008). Over the course of modern history, events involving the introduction of

new technology have offered a means to transform raw materials into final products or services. These events have led to four industrial revolutions that offered humanity sources of power and tools to increase efficiency, effectiveness, wealth, and introduce change into society. Unfortunately, some of this change has been negative due to technological dehumanization introduced by each industrial revolution (Halsam, 2006; Turkle, 1984). Halsam (2006, pp. 252-4) described this negative outcome as a "pathology of mechanization" due to its "robotic pursuit of efficiency and regularity, automaton-like rigidity and conformity, and approach to life that is unemotional, apathetic, and lacking in spontaneity." These attributes are inconsistent with positive characteristics of human nature such as emotional responsiveness, interpersonal warmth, openness to experience, engagement, and virtuous aspects of character (Halsam, 2006; Peterson & Seligman, 2004). We now describe the four industrial revolutions to date that have shaped the situational context for leaders and followers over the past four centuries.

Industry 1.0

The First Industrial Revolution (Industry 1.0) began in the 1780s and involved the introduction of machines fueled by water and steam power. Economies shifted from agrarian to industrial as people began to migrate from rural regions to cities which offered jobs in factories. Industrialist owners sought to maximize their own wealth through the introduction of machines operated by a labor force of poorly paid and overworked humans (Rosen, 2012).

Industry 2.0

The Second Industrial Revolution (Industry 2.0) began in the 1870s and involved the introduction of electricity as a source of power, which fueled relatively advanced machinery that used assembly lines for the mass production of goods. People continued to populate large cities and provided a labor force for industrialist

factory owners who sought to maximize the wealth of shareholders. Factory owners used principles of scientific management derived from engineering processes to analyze and improve workflows and productivity (Taylor, 1911), while paying little attention to the wellbeing of the human labor force. Such leadership, which prioritized machines over humans, continued the trend of dehumanization of a workforce that began with the advent of Industry 1.0 (Halsam, 2006; Rosen, 2012).

Industry 3.0

The Third Industrial Revolution (Industry 3.0) began in the late 1960s and introduced automation and computing power into organizations. Process engineers and operational auditors began to study workflows to identify ways to streamline processes, eliminate waste, and substitute tedious human work tasks with automated processes. The manual work of the labor force could now be automated by programmable mainframe computers capable of performing tedious jobs accurately, efficiently, and effectively, thereby generating productivity and safety gains for organizations and their shareholders. These gains were accelerated by the introduction of personal computers into organizations that were linked via local area networks in the early 1990s, along with the development of the Worldwide Web (or Internet) as a tool for the exchange of ideas and collaboration. Turkle (1984) highlighted the dehumanizing effects of computers in organizations as legitimizing a lack of emotion, intuition, and spirit in the workplace. In line with this view, Halsam (2006, p. 254) argued that the overuse of computers in education "will reduce social relatedness and increase standardization, at the expense of students' individuality." Such dehumanizing effects of technology are at odds with the human condition which requires self-expression to maintain one's unique self-identity (Ashforth & Mael, 1989) and a variety of character strengths to give people their unique sense of self in organizations (Sosik & Cameron, 2010).

Industry 4.0

The Fourth Industrial Revolution (Industry 4.0) began in the 2010s and introduced the Internet as a source of power for cyber-physical systems such as robotics, drones, and artificial intelligence (AI) that are connected to each other and to individuals. This form of power allows for mass customization of products and services and connectivity of people and machines that are linked together via the Internet, social media, or in virtual worlds such as Second Life (https://secondlife.com). With the advent of AI, robots, and machine learning, the role of technology as a substitute for human leadership is now possible (Avolio et al., 2014; Schwab, 2017). This new reality is emerging despite its potential threat of mechanistic dehumanization stemming from technology's characteristics that stand in stark contrast to human traits and character: inertness versus emotional responsiveness, coldness versus interpersonal warmth, rigidity versus cognitive openness, passivity/ fungibility versus agency/individuality, and superficiality versus depth (Halsam, 2006).

As the human labor force continues to be replaced with AI and robots, the nature of work in the age of Industry 4.0 is rapidly changing. The workforce of Industry 4.0 organizations is shifting from traditional career and tenured employees to an alternative workforce comprised of contract, freelance, and gig employees who supplement (or replace) a full-time workforce (Kaji et al., 2019). This trend may introduce challenges to developing employee loyalty and teamwork, which represent an important aspect of character that reflects virtues of humanity and social justice (Peterson & Seligman, 2004). Another trend is the shift from jobs to "super-jobs" as jobs become more automated by AI and robots, and tasks and process flows become more digital, multifunctional, and data-driven. Whereas traditional jobs are organized around standardized and repeatable tasks that require a specific narrow skillset, super-jobs combine many

traditional jobs and augment their performance with technology to accomplish tasks that require a complex set of technical and human skills (Kaji et al., 2019). An additional trend is the need to emphasize leadership development that considers how technology influences leadership, how leadership influences technology

Organizational learning will become more customized and job specific. Employees will be expected to engage in life-long career-related learning. Internal talent will be more global and mobile and deployed across organizational units to fill leadership positions.

(Avolio et al., 2014), and develops competencies such as managing change, dealing with risk and uncertainty, and utilizing AI, data analytics, and robotics (Deloitte, 2019).

Organizational changes are projected for Industry 4.0 as well. Human resource (HR) departments will be challenged with acquiring requisite talent internally and via alternative workforces. Consideration of a complete employee experience that includes attracting, hiring, onboarding, engaging, meeting performance goals, fostering career growth, and facilitating a positive departure experience is being advocated by management consultants (Pendell, 2018). Organizational learning will become more customized and job specific. Employees will be expected to engage in life-long career-related learning. Internal talent will be more global and mobile and deployed across organizational units to fill leadership positions. Internet cloud-based HR platforms will become the norm along with increased automation and AI-based applications that supplement HR decision-making systems (Kaji et al., 2019).

Given the emphasis some HR departments and management consulting organizations are now placing on fostering a positive "employee experience" from recruitment to departure (Pendell, 2018), trends to expand the employee experience to a broader "human experience" that highlights the purpose and meaning of work by connecting it to life domains outside of work and its positive social impact are expected and encouraged (Deloitte, 2019). The provision of purpose and meaning through transformational leadership and transcendent virtues are firmly established in the literature as means to support and enhance this trend (e.g., Bass, 2008; Sosik & Cameron, 2010). Teamwork is a second organizational change that is expected to continue as a means for greater collaboration and interdependence of employees and other organizational stakeholders. While traditional and virtual teams have been common in organizations since the late 1990s (Avolio et al., 2014), many leaders are not aware of how to design, influence, and reward such teams (Kaji et al., 2019). Virtues reflecting humanity and justice that foster teamwork are suitable for designing training interventions aimed at increasing the state of leader readiness regarding this issue (Sosik, 2015). The need to reward team members who share leadership in teams is a related trend that leaders will face the Industry 4.0 era (Kaji et al., 2019). The literature on virtue, character and leadership is replete with ideas to meet these challenges and is introduced below.

Virtue, Character, And Leadership

Scholars have a long history of interest in examining virtues and character strengths. One of the most significant contributors is Aristotle who distilled the work of Plato to identify four cardinal virtues that are central to the Judeo-Christian tradition: prudence, fortitude, temperance, and justice. These Western virtues are consistent with those espoused in the

Eastern Confucian tradition such as benevolence, righteousness, integrity, and fortitude (Zhu, Zheng, He, Wang, & Zhang, 2019). Aristotle's cardinal virtues were adapted by Thomas Aquinas in *Summa Theologica* as core guideposts for Church doctrine (Sheen, 1999) and core elements in modern considerations of character.

Both Aristotle and Confucius considered the acquisition of good character to be a function of social interaction, introspection, and willed positive behavior (Born & Megone, 2019; Riggio, Zhu, Reina, & Maroosis, 2010; Sheen, 1999). Aristotle (1999) considered character to represent a person's distinctive moral and mental qualities that are comprised of certain strengths (good qualities or virtues) and weaknesses (bad qualities or vices) stemming from a strong will (acrasia) or a weak will (encrasia). Character is developed through observations of exemplars who role model positive traits that are recognized and then integrated into the self-concept via social learning processes (Bandura, 1991). Character is further developed through willed introspection which identifies bad aspects of character to be eliminated through abstinence, and good aspects of character to be wisely limited in their use through moderation (Sheen, 1999). Using Confucian philosophy to describe the culture of mythical Shangri-La in *Lost Horizon,* Hilton (1936, pp. 90-91) wrote "...I should say that our prevalent belief is in moderation. We inculcate the virtue of avoiding excesses of all kinds – even including, if you pardon the paradox, excess of virtue itself." Consistent with this view, Aristotle (1999) suggested that predictors of character that he called "actions" or "passions" can be taken too far and lead to negative outcomes unless they are exercised in moderation.

More recently, Peterson and Seligman (2004) published a landmark tome on virtues and character strengths associated with human well-being and flourishing. These positive psychology scholars sought to identify what represents the absolute best elements of humanity. In determining the list of character strengths and virtues, they examined the influential cultural and historical societies, namely, the traditions of Confucianism, Taoism, Buddhism, Hinduism, Ancient Greek philosophy, Christianity, Judaism, and Islam. They concluded that their grouping of 24 character strengths into six broad virtue classifications of wisdom and knowledge, courage, humanity, justice, temperance, and transcendence is ubiquitous across societies influenced by these traditions.

Wisdom and knowledge embody cognitive strengths that entail the acquisition and use of knowledge: creativity, curiosity, love of learning, open-mindedness, and perspective. Courage is equivalent to Aristotle's cardinal virtue of fortitude and represents emotional strengths that involve exercise of the will to accomplish goals in the face of opposition: bravery, honesty/integrity, persistence, and vitality. *Humanity* corresponds to interpersonal strengths that involve tending to and befriending others: love, kindness, and social intelligence. *Justice* is another cardinal virtue and reflects civic strengths that underlie healthy community life: citizenship, fairness, and leadership. *Temperance* is also a cardinal virtue and involves strengths that protect against excess: self-regulation/control, prudence, forgiveness and mercy, and humility. *Transcendence* represents strengths that forge connections with the larger universe and provide purpose and meaning for life: spirituality, hope, appreciation of beauty and excellence, gratitude, and humor (Peterson & Seligman, 2004). As Sosik, Chun, and Ete (in press) pointed out, subsequent factor analytic studies have found variations in the number of these virtue categories and the sorting of the character strengths into the virtue categories (e.g., Ruch & Proyer, 2015). Nevertheless, the VIA classification remains the most prominent and comprehensive classification of character strengths in the social sciences (Wright & Quick, 2011).

Character strengths are positive and measurable trait-like attributes and psychological processes that allow for the manifestation of virtues through authentic or ethical behaviors (Peterson & Seligman, 2004). Virtue represents exemplary character and temperament, morally good and right behaviors that leaders ought to do, and human excellence, all of which should result in good consequences. In contrast, vice represents deficient character and temperament, immoral and wrong behaviors that people ought not to display, and human degradation, which lead to bad consequences (Sheen, 1999). Virtue results from a strong will that overrides impulses toward negative thoughts, emotions, traits, and behaviors, thereby converting them to positive elements of character. Vice results from a weak will that fails to control such impulses, and yields to such negative personal attributes (Kugelmann, 2013).

Philosophers consider the will to be a cognitive mechanism that chooses a certain emotional, logical, or behavioral response, often over predispositions toward less than virtuous choices (Kugelman, 2013; Sheen, 1999) and is similar to what psychologists consider when discussing self-awareness and self-regulation/control (Sosik et al., in press). Character development is a lifelong process whereby leaders continually reflect upon their virtues, vices, identities, knowledge, abilities, and goals to accumulate virtue and decrease vice in self and others (Riggio et al., 2010; Sosik, 2015). As such, character-based leadership can be developed through willed conduct to gain knowledge of the self and others that prompts airmen and other leaders to initiate constructive engagement with others, which is particularly important in cross-cultural contexts and in military deployments in different countries (USAF, n.d.).

To develop character, leaders first need to take ownership of the moral aspects of an environment, and then have the courage and self-efficacy to guide and direct their behavior to create a virtuous and moral environment (Hannah & Avolio, 2011). These psychological processes enable virtuous behaviors when principles of virtue overcome bad thoughts and feelings when leaders may be tempted by vices. This line of research suggests that virtuous habits of conduct superimposed on leaders' personal attributes influence how they behave with stakeholders, and how these and prior interactions shape their self-identity over a series of life events. In sum, character describes what constitutes the habitual virtuous practices and interactions of leaders, followers and other stakeholders, which may produce positive effects on organizations wishing to support the human condition in the era of Industry 4.0.

Virtue And Character Strengths To Support Human Principles Of Social Enterprises

In a recent analysis of global human capital trends, Kaji et al. (2019) proposed five benchmarks for the reinvention of social enterprises operating in Industry 4.0: purpose and meaning, ethics and fairness, growth and passion, collaboration and personal relationships, and transparency and openness. Each of these benchmarks offers guidelines on how to support the human condition in contexts where technology is projected to strongly influence the operation and leadership of organizations. In this section, we explain how aspects of character can be used to implement these benchmarks and support the human condition by knowing self, knowing others, and constructively engaging with others.

Purpose and Meaning

Kaji et al. (2019, p. 5) defines purpose and meaning as "giving organizations and individuals a sense of purpose at work; moving beyond profit to a focus on doing good things for individuals, customers, and society." Social enterprises value social responsibility and triple-bottom line goals of human development and wellbeing, generating profits by doing good business, and sustaining resources. Such goals provide purpose and meaning beyond the maximization of wealth of shareholders. To support these initiatives,

we propose the virtues of wisdom and knowledge, and transcendence as resources for leaders.

Two character strengths that reflect the virtue of wisdom and knowledge, namely love of learning and curiosity, are particularly relevant for generating purpose and meaning to individuals and organizations, including military forces. People want to know why the work they are performing is meaningful and valuable. Expanding an organization's purpose beyond mission accomplishment and profit maximization to include social, communal, and environmental goals may inspire a sense of commitment and constructive engagement if leaders possess a love of learning and/or curiosity. Love of learning involves "mastering new skills, topics, and bodies of knowledge," whereas curiosity represents "finding subjects and topics fascinating, and exploring and discovering" (Peterson & Seligman, 2004, p. 29). Manifestation of these character strengths through leadership behaviors that inspire followers with an evocative vision that fosters teamwork is likely to produce constructive engagement among followers. Positive visions of an organization's future are achieved through collective action, and this requirement encourages followers to constructively engage with others to achieve the vision (Sosik & Cameron, 2010). A love of learning and curiosity among leaders and followers can build a greater sense of interdependence, task interest, and focus required to perform the complex jobs involving interactions with diverse individuals assisted by AIT.

Providing purpose and meaning to individuals and organizations can also be achieved with character strengths that reflect the virtue of transcendence. Appreciation of beauty and excellence represents "a sense of awe, wonder, and elevation of spirit when… recogniz[ing] extraordinary people or things" (Sosik, 2015, p. 65), whereas spirituality involves "knowing

where one fits in within the large scheme" (Peterson & Seligman, 2004, p. 30). Purpose and meaning are derived through work projects, important deeds, and the experience of something or someone profound (Frankl, 1992). Leaders' personal spiritual beliefs influence their constructive development and meta-beliefs, which serve as a schema to filter and frame information (Phipps, 2012). Therefore, leaders who possess the strengths of spirituality and/or appreciation

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of beauty and excellence can frame the work followers perform as serving a greater and meaningful cause (Mark, Wheeler, & Hodson, 2012).

Leaders can also emphasize the unique features of the human contributions to super-jobs that make them enjoyable and add value above and beyond what technology brings to the tasks. The design of super-jobs that include motivating features such as skill variety and task significance have been shown to relate positively with employee's positive emotion and subjective wellbeing (Oerlemans & Bakker, 2018). In addition to these job redesign and enrichment tactics, the forging of interpersonal relationships with a variety of organizational stakeholders is likely to help individuals learn more about themselves and others.

Ethics and Fairness

Kaji et al. (2019, p. 5) defines ethics and fairness as "using data, technology, and systems in an ethical, fair,

and trusted way; creating jobs and roles to train systems and monitor decisions to make sure they are fair." The pervasiveness of data mining and analysis in Industry 4.0 contexts is widespread and includes sensors, AI, and robots that collect online data from employees, customers, and internet users, with or without their consent (Avolio et al., 2014). As organizations shift toward jobs, workflows, and decision-making that is automated, human oversight of these processes

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and outcomes is necessary to substitute for AIT's current inability to understand the nuances of ethics and morality required when performing these tasks. To support these initiatives, we propose the virtues of courage, justice, and temperance as important cognitive, emotional, and motivational resources for leaders.

Two character strengths that reflect the virtue of courage are particularly relevant for promoting ethics and fairness in Industry 4.0. Although public scrutiny via social media, online forums, anonymous blogs, and trolling represent a policing force to call out unethical behavior, the ability of leaders to manufacture false images, fake news, and present inauthentic online impressions remain as threats (Schwab, 2017). The character strengths of honesty and bravery can aid

leaders' ability to monitor the validity and reliability of information they present and help them determine what information should be considered public versus private. Honesty represents "speaking the truth but more broadly presenting oneself in a genuine way and acting in a sincere way" (Peterson & Seligman, 2004, p. 29) whereas bravery involves standing up for what is right and acting upon moral convictions in the face of opposition (Sosik, 2015). For example, in a military context, USAF captains' honesty and bravery were found to be positively related to the manifestation of their ethical leadership behavior for highly self-controlled officers (Sosik, Chun, Ete, Arenas, & Scherer, 2019) and to board members' ratings of managerial performance for corporate executives and middle managers (Gentry et al., 2013; Sosik, Gentry & Chun, 2012). Self-awareness of one's honesty and bravery and their manifestation in personal life experiences can build a strong identity as an authentic leader (Sosik, 2015). This stream of research suggests that Industry 4.0 leaders will need to possess honesty and bravery to achieve similar performance outcomes in military and business contexts.

Acting with ethics and fairness can also be achieved with two character strengths that reflect the virtue of justice. Citizenship involves "working well as a member of a group or team; being loyal to the group; doing one's share" of the work, whereas fairness involves "treat[ing] all people the same according to all notions of... justice; not letting personal feelings bias decisions about others" (Peterson & Seligman, 2004, p. 30). Cameron and Sosik (2016) argued that corporate citizenship is enhanced with corporate oversight functions, social sanctions, and disclosure processes aimed at promoting ethics and fairness. Their proposition is relevant due to the permanent nature of digital footprints that make

publication of ethical scandals both psychologically and financially costly to leaders and their organizations, as seen in the widely publicized Equifax and Facebook data breach scandals.

In addition, self-regulation/control is a character strength that reflects the virtue of temperance and may encourage ethical behavior and fairness. As another military example, Sosik et al. (2019) found that only USAF captains who possessed high levels of self-control are able to manifest their character strengths of honesty, humility, bravery (moral courage), and empathy (social intelligence) in ethical leadership behavior and yield higher performance ratings from their superiors. Self-control assists with knowing oneself because its willpower resources serve to override impulsive thoughts, emotions, and behaviors that can cause adverse outcomes. These results suggest that self-control possessed by leaders and followers interacting in Industry 4.0 settings characterized by high visibility and constant contact may serve as internal controls for unethical actions that substitute for external controls of corporate governance/regulation and prevent public shame from a permanent online record.

Growth and Passion

Kaji et al. (2019, p. 5) defines growth and passion as "designing jobs, work, and organizational missions to nurture passion and a sense of personal growth; affording people the opportunity to create and add to their personal growth." This definition suggests that the nature of technology-assisted super-jobs requires a great deal of collaboration and continual learning given Industry 4.0's intense rate of change. It also suggests that transformational leadership style (Bass, 2008) which inspires teamwork, exemplifies excellence, promotes innovation, and encourages human development is appropriate. To support these initiatives, we propose the virtues of wisdom and knowledge, and humanity as resources for leaders.

The character strength of love of learning is especially relevant for the integration of growth and passion into jobs, work processes, and organizational missions. Love of learning is associated with intellectually stimulating behaviors that transformational leaders use to engage followers in their work. It prompts problem-solving and creativity behaviors that create optimal experiences for followers (Sosik, 2015). The Gallup Organization describes such psychological states as employee engagement because they not only involve high levels of interest, challenge, and focus, but also require forms of collaborative learning that enhance the knowledge of others and promote their constructive engagement (Pendell, 2018). In the era of Industry 4.0, one's expanded technical and interpersonal skills are likely to support these two aspects of the human condition because knowledge of the history, politics, and sociology of our globalized and highly connected world has been deemed important for success in military and business contexts (Schwab, 2017; USAF, n.d.).

Another strength that can promote growth and passion is one that reflects the virtue of humanity, namely social intelligence. The ability to recognize and regulate emotions in self and others, to act appropriately across a range of social situations, and to use sophisticated political and influence tactics are the hallmarks of socially intelligent leaders (Sosik, 2015). These skills are typically developed over one's career and life through social learning processes (Bandura, 1991). Because social networks (both traditional and online) have become more widespread and complex due to AIT availability and globalization (Deloitte, 2019), we believe that social intelligence is a requisite character strength for airmen and other leaders, especially those at mid-level rank who are accountable for both executing strategic directives from the upper echelon and satisfying the developmental needs of subordinates who perform super-jobs with the assistance of AIT (Gentry et al., 2013).

Collaboration and Personal Relationships

Kaji et al. (2019, p. 5) defines collaboration and personal relationships as "building and developing teams, focusing on personal relationships, and moving beyond digital to build human connections at work." Collaboration and personal relationships are important because Industry 4.0 introduces social isolation and dehumanization as byproducts of a geographically dispersed workforce that often functions in virtual teams with AIT systems that can introduce errors into operations (Avolio et al., 2014; Mak & Kozlowski, 2019). As the number of employees working at home and/or in virtual teams increases, greater support for teleworkers and members of teams working remotely through laptop computers connected via the Internet will be required (Kaji et al., 2019). To support these initiatives, we also propose the virtues of humanity, justice, and transcendence as valuable resources for leaders.

Social intelligence can enhance collaboration and personal relationships. Members of effective virtual teams spend time getting to know each other on an informal basis, agree upon goals, roles, and communication expectations at their outset, and share leadership (Mak & Kozlowski, 2019). These tasks serve a similar function as those found in high-quality team member exchanges which involve frequent communication and sharing of resources, and interpersonal trust fostered with transformational leadership (Chun, Cho & Sosik, 2016). Given that social intelligence promotes smoother social functioning (Peterson & Seligman, 2004), we believe that it can foster collaboration and improve personal relationships at work by increasing the frequency and quality of communication between virtual team members thereby decreasing their social isolation while increasing their ability to know others.

A second strength that can enhance collaboration and personal relationships is one that reflects the virtue of justice, namely citizenship. The loyalty, social responsibility, and valuing of teamwork that characterizes citizenship "promotes relationships of reciprocity" that bring a collaborative relational approach to employee interactions (Cameron & Sosik, 2016, p. 4). Sosik (2015, p. 62) reviewed literature which indicates that "citizenship has been linked to higher levels of social trust, increased understanding of politics, and more positive views of human nature." These correlated outcomes are likely to assist airmen and other leaders to better know their colleagues and engage more constructively with them because of the sense of responsibility and reciprocity that is forged by citizenship. These outcomes are especially important because of the social isolation found in Industry 4.0 work contexts.

Another character strength that can enhance collaboration and personal relationships is one that reflects the virtue of transcendence, namely gratitude. This strength involves the recognition and appreciation of good things that happen, and the expression of thanks and appreciation for them. People who express gratitude are more likely to engage in prosocial helping behavior required for collaboration and teamwork (Peterson & Seligman, 2004) and experience higher levels of subjective well-being and successful functioning across the lifespan (Chopik, Newton, Ryan, Kashdan, & Jarden, 2019). Gratitude is associated with positive attitudes (e.g., optimism) and psychological states (e.g., determination) that make social interactions more effective and enjoyable (Sosik, 2015). By helping others and experiencing greater positive affect and life satisfaction, and less negative affect, leaders are likely to engage in more fulfilling collaborations and experience higher quality social exchanges with team members, thereby allowing for constructive engagement with them based on a more expanded knowledge of each other. Gratitude

may also encourage the use of rewards in teams, which is currently a challenge for Industry 4.0 leaders (Kaji et al., 2019).

Transparency and Openness

Deloitte (2019, p. 5) defines transparency and openness as "sharing information openly, discussing challenges and mistakes, and leading and managing with a growth mindset." This definition suggests that the rights of data transparency and common repositories of data with open public access must be balanced with individual rights to privacy and protection of personal data. It also recognizes that the reconciling of these two competing rights occurs through trial and error, as seen in how Facebook and Equifax responded to their data breach scandals. Such learning processes require a growth mindset that assumes that one's capabilities are not fixed but can be developed through effortful trial and error learning and the valuing of continual self-improvement (Dweck, 2006). To meet these challenges, we propose the virtues of wisdom and knowledge, and courage as resources for leaders, specifically the character strengths of love of learning and honesty.

Honesty and love of learning are relevant for promoting transparency and openness. Adopting new technologies, determining the degree of data privacy that should be granted, or identifying the extent of decision-making authority that should be yielded to robots and AI represent uncharted territory for Industry 4.0 leaders (Kaji et al., 2019). The complexity of these novel challenges is expected to result in human error and miscalculations that will require further consideration, evaluation, and learning. Covering up such failures is difficult given the pervasiveness of social media, speed of information transfer over the Internet, and high degree of connectivity of people and technology (Avolio et al., 2014). Honesty involves being true to oneself and others, and prompts authenticity in one's presentation of self in organizational events

(Sosik, 2015). Individuals grow in knowledge of self and others through refinement processes involving introspective examinations of their personal failures (Sheen, 1999). We believe that honesty and love of learning will promote the intrinsic motivation, growth mindset, and dialogue required to move beyond initial failures, refine understanding of such issues, and result in more effective socio-technological integration.

Recommendations And Conclusion

In this article, we have highlighted several character strengths that may potentially support the human condition and serve as benchmarks for re-inventing organizations in the era of Industry 4.0. In this final section, we proffer some brief recommendations based on our review of the character and leadership literature to guide future work in this area.

Our discussion focused on the potential for love of learning, curiosity, honesty, bravery, social intelligence, citizenship, fairness, self-regulation/control, appreciation of beauty and excellence, and gratitude to support the design of social enterprises in Industry 4.0. Whereas this range of character strengths taps each of the six virtue categories in the VIA classification (Peterson & Seligman, 2004), it is not intended to be an exhaustive consideration of all strengths that can serve this purpose. These and other strengths should be examined in future research and leadership training projects.

As suggested in this article, there are many possible outcomes of the interaction of character strengths with AIT in the era of Industry 4.0. As Kaji et al. (2019, p. 32) argued, "...if the jobs and the work are redesigned to combine the strengths of the human workforce with machines and platforms, the result can be significant improvements in customer service, output, and productivity." If the strengths of the human workforce complement those of AIT, and not work in opposition

to each other, these and other outcomes may be possible, but only after forums for their theoretical and empirical study are initiated to guide the co-existence of social and AIT systems.

With AI/machine learning becoming more common, character and ethical decision-making will become more important. Leaders will need to be aware of AIT and how it works. They will need to create a character-strengths-based culture that enables

> *...Trends toward technology playing a more dominant role in the leadership systems of Industry 4.0 require significant changes to the content of leadership development programs.*

the workforce to be able to draw the line between what they can do with AIT and what they should do with it (S. S. Kahai[2], personal communication, October 3, 2019).

How Industry 4.0 organizations are designed in the future, and how they change will no doubt be affected by the extent that leaders and followers display character strengths to support the functions served by AIT. It may be time to seriously consider the inability of AIT to possess virtue and how humans will be required to substitute for any such gaps by recognizing which of their strengths meet operational demands.

Although the human condition has remained essentially constant over the ages (Hodkinson, 2001), trends toward technology playing a more dominant role in the leadership systems of Industry 4.0 require

significant changes to the content of leadership development programs. We suggest the training of skills such as change and risk management, systems thinking, data analytics, AI, simulations, and character-based leadership so that leaders can learn how to competently apply these skills to the complex situations they will face in Industry 4.0.

We need to better understand how character strengths support the processes of knowing self, knowing others, and constructive engagement in the era of Industry 4.0. This entails examining these constructs both theoretically and empirically with experiments, case studies, and longitudinal field studies with military and industry samples collected globally that deploy the types of AIT discussed in this article.

Opportunities to train leaders on these topics are promising based on existing university courses described in the literature (e.g., Crossan, Mazutis, Seijts, & Gandz, 2013; Sosik, 2015). For example, courses taught at the United States Air Force Academy, Air University at Maxwell AFB, and Penn State University provide instruction on the application of character strengths to situations faced by students in field operations and the office. As AIT adoption continues to expand in military and industry contexts, we recommend placing more emphasis on the benchmarks for re-inventing the social enterprises of Industry 4.0, and what social and AIT systems can do for us and to us with (and without) proper application of character and virtue.

In conclusion, although the era of Industry 4.0 emerged less than a decade ago, its opportunities and threats have quickly presented themselves to leaders in military and business organizations. It is our hope that, with proper appropriation of character and virtue, all leaders can meet the challenges of Industry 4.0 with strategic clarity, mission focus, and a better

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understanding of the human condition across all industries, cultures, and societies.

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