

Future of Work in the Digital World: Preparing for Instability *and Opportunity*

Robert W. Lent

Despite conflicting forecasts about the pace and extent of technological changes that lie ahead, it is difficult to dispute the impact that advances in automation, robotics, and artificial intelligence have already had on work in the United States and globally. Hirschi (2018) provided an excellent discussion of these developments and what they may mean for career clients, practitioners, and researchers. The author aims to complement Hirschi's contribution by (a) amplifying the nature of the challenges faced by workers, both currently and in the foreseeable future, and (b) considering steps that may be taken by career development experts, both individually and collectively, to meet these challenges. These steps include advocacy for displaced workers, participation in dialogues to transform educational institutions, and efforts to extend the range of counseling interventions to prepare clients for a career future that may be far less stable for increasing numbers of workers.

Keywords: technology, work, career preparedness, advocacy, social cognitive career theory

Only a few years ago, I had written that “these are both challenging and exciting times for the field of career development and counseling. . . . Wrought by sweeping change in such areas as technology, the global economic environment, and demographic and immigration patterns, the work world has become faster paced, more diverse, and less and less predictable for more and more workers” (Lent, 2013, p. 2). This passage had been occasioned by a major economic recession. Yet, despite notable signs of improvement to the U.S. economy, many workers continue to face diminished employment opportunities and stagnant wages, and many more may face an uncertain work future. As practitioners and researchers devoted to career development, we need to be prepared for the changes that have been forecast because of the impact they will have on our ability to both prepare students to enter the workforce and assist workers to adjust to work and adapt to changing economic conditions.

Hirschi (2018) provided an excellent overview of career development problems owing to rapid technological change, along with proposed solutions. In this article, I attempt to build on his foundation, first by considering the current and projected magnitude of the challenges for students and workers and second, by suggesting additional steps that might be taken to better prepare ourselves and our clients for what has been variously called the fourth industrial revolution (Schwab, 2016), the third digital revolution (Gershenfeld, Gershenfeld, &

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Cutcher-Gershenfeld, 2017), the second machine age (Brynjolfsson & McAfee, 2014), the age of accelerations (Friedman, 2016), and (with some irony) the robot apocalypse (Mishel & Bivens, 2017). Although some of my proposed solutions are informed by social cognitive career theory (SCCT; Lent & Brown, 2013a; Lent, Brown, & Hackett, 1994), most are intended to be transtheoretical and compatible with common career intervention practices.

Meet the New Economy—Same as the Old Economy?

Although there appears to be general agreement that the economy is in the process of substantial transformation, it is important to acknowledge that economists, technologists, and other writers offer sharply conflicting views on the present and future of work.

Cause for Concern?

There is no shortage of alarming pronouncements about the future of work, with some disturbing trends already apparent. The forces behind these prognostications are multifaceted and include, among others, a rise in the offshoring or migration of certain industries and jobs from one geographic location to another; multinational corporations that can exploit labor and tax opportunities around the world; unequal distribution of wealth and the increasing power of the financial industry; and fierce global competition, leading many companies to employ a smaller, lower paid, and less permanent workforce (Ford, 2015; Friedman, 2016). Intersecting with and abetting these economic trends are a set of technological advances that might be termed the unholy trinity of automation, robotics, and artificial intelligence. These “brilliant technologies,” enabled by exponential improvements in the speed and power of computers, are widely seen as game changers, with the potential to fundamentally disrupt the world of work, in both positive and negative ways, for generations to come (Brynjolfsson & McAfee, 2014).

The causes for concern about the labor market are not limited to hypothetical or long-term projections. Some economists and journalists have asserted that, especially since the recent economic recession, we are witnessing a “new, less secure labor market” (Samuelson, 2017, para. 2) and a jobless recovery in which many lower and middle-skilled jobs in the United States have been lost and replaced by lower paying and less stable jobs (without health care or other benefits), largely in retail and service (e.g., fast food) industries. Although many businesses have recovered nicely, there has been a reluctance to revert to prerecession workforce sizes, with many corporate leaders expecting greater productivity from their current workers, often aided by automation of tasks that can be performed more cheaply and efficiently by technological means. Although these trends have affected many white- as well as blue-collar workers (Friedman, 2016), special concern has been expressed about “the precariat,” that is, those who perform lower skilled and lower paying jobs, often under unpleasant working conditions, and who are most vulnerable to the forces of economic competition and automation (Blustein, Kenny, & Diamonti, 2017).

Cause for Optimism?

Mark Twain was famously quoted as having said that “the reports of my death have been greatly exaggerated.” In a similar vein, some writers do not agree with pessimistic forecasts regarding job loss or economic instability. For example, in a recent *Washington Post* article, Samuelson (2017) observed that

the unemployment rate of 4.3% (as of July 2017) was at its lowest point in the past 16 years and argued that “the postwar employment model might make a comeback” (para. 4). Some writers even foresee labor shortages, particularly in certain industries and economic sectors, in the near- and long-term futures. The retirement of members of the massive baby boom generation, for example, could create many job openings and make experienced, competent workers a prized resource—assuming that businesses elect to replace at least some of their retirees. In a careful analysis of economic data, Mishel and Bivens (2017) concluded that “there is no empirical support for the prominent notion that automation is currently accelerating exponentially and leading to a robot apocalypse” (p. 3).

It may be observed that, even while technology displaces some workers, it can enhance the work lives of many people by assisting with completion of routine, dangerous, or unpleasant tasks; it is also making new jobs available and can provide new opportunities for work–life balance. For example, the internet and social media platforms have fueled the rise of an evolving variety of alternative work arrangements. These include the gig economy (i.e., the matching of businesses with workers willing to engage in temporary, contract, and freelance work), the peer economy (online businesses such as TaskRabbit, Uber, and Airbnb that enable workers to provide services directly to consumers), and crowdsourcing (an online method for distributing complex, labor-intensive projects over large numbers of independent workers; e.g., Mechanical Turk). Owing to the rapid development of these arrangements, writers do not all agree on how to define them or how to classify particular examples, such as Uber. It should also be noted that, although such new work platforms are often touted for their flexibility (e.g., allowing workers to set their own work hours or conditions), they are not without their downsides (e.g., compensation is often modest, and benefits, such as health insurance, are typically not provided by the work distributor/employer). “Fab labs” (fabrication laboratories using computer-controlled tools) and 3-D printing will be able to produce an astounding array of objects (Gershenfeld et al., 2017); however, it remains to be seen whether they can fabricate jobs and new means of economic sustenance—or represent yet another existential threat to current jobs.

What’s a Career Counselor to Believe?

It is difficult to choose among these conflicting forecasts. Are we heading toward a postwork or postsalary economy? Will stable work with good compensation and benefits become increasingly elusive? Will “thinking machines,” algorithms, and robotics make more and more workers obsolete? Or will the latest digital revolution create new, meaningful work opportunities; bolster local communities; and promote economic and environmental sustainability (Gershenfeld et al., 2017)? Will workers become entrepreneurial free agents—or merely innocents at the mercy of better connected entrepreneurs? Are the new work platforms, such as the gig economy, a boon to freedom and life balance—or a gateway to economic instability? Is the age of accelerations ushering in an age of survival of the fittest?

Odd as it may seem, both the optimistic and pessimistic sets of predictions are plausible. It may depend on the time horizon and, for an individual worker, on one’s skill set. Driverless vehicles could render cab drivers and long-haul truckers obsolete in the not-too-distant future. Still, even many white-collar or knowledge workers are unlikely to be immune from automation. How one fares may depend partly on whether one has the skills to work with, complement, or circumvent technology. It may also depend on factors such as how routine one’s work tasks are. Regardless of whether they involve cognitive or manual skills, relatively routine tasks involving predictable and repetitive

sequences are more likely to succumb to automation—and, in fact, such jobs have already experienced declining numbers (Autor, Levy, & Murnane, 2003; Frey & Osborne, 2013).

Individuals who perform less routine tasks, regardless of how cognitive or manual they are, may be harder to replace with current technology, although this may not always be the case. Frey and Osborne (2013) argued that advances in pattern recognition will allow automation to compete with humans in performing many nonroutine tasks. However, they envisioned nonroutine work involving complex perception and manipulation, creativity, and social intelligence (e.g., negotiation, persuasion, care) as less likely to be replicated by computers over the next decade or two. Still, a plausible rule of thumb is that, if a computer program can “learn” how to do a person’s job and then do it more cheaply and efficiently, the job may be a good candidate for automation, at least in the long run (Ford, 2015). Many employers may find it difficult to balance concerns about workers’ well-being with the potential for greater profit and productivity that could be achieved via automation. At the same time, unemployed or underemployed individuals have diminished ability to purchase goods and services—a fact that will not go unnoticed by economic policy makers and businesses. Frey and Osborne noted several countervailing forces that could slow technology-based work disruption, such as political activism, government regulation, engineering bottlenecks, and public concerns about technological progress.

I resonate with Samuelson’s (2017) optimistic assessment that “the goal now is to convert the worker shortage into a better-paid, better-trained and more productive labor force” (para. 11). In such a view, wages may rise, benefits may be restored, and immigration bans may eventually be replaced by welcome mats and border walls by welcome mats. Although I like this view, I do not think we can count on it. The pace and destination of change are difficult to predict, even for economic and technological experts. Yet, it is difficult to deny the reality of unemployment, underemployment, and precarious work—for many people—at present. As career counselors and vocational psychologists, what should be our stance? How can we remain helpful to our clients, and what changes can we expect for our own field? I am not advocating either techno-optimism or techno-pessimism; however, a healthy dose of techno-caution may be necessary to help our field prepare for a time of great flux in the work world.

Planning for an Uncertain Future of Work: Two General Strategies

First, we need to acknowledge the limits of our professional capabilities. I would like to believe that, as a profession, we do a fine job of helping people to plan for—and adjust to—the work that is available. However, we do not by and large create jobs or determine wages. Like most other workers, we largely react to prevailing market forces. This is not to minimize the very valuable roles our field can play within the realms of advocacy, public policy, and other large-scale change efforts. However, at the level of working with clients, we need to emphasize the things we can control—namely, our capacities to help clients prepare for and adapt to existing conditions and to anticipate change. These same capacities are, of course, also needed to manage our own careers.

In this section, I consider two broad responses to outsourcing, globalization, automation, and various other current threats to many workers and to the very availability of work. The first are responses that are internal to our field—in particular, our paradigms, goals, and techniques of career intervention. The

second are externally directed responses, that is, “upstream” efforts to affect how people prepare for and remain viable at work (largely via educational institutions and training opportunities) and to encourage the strengthening of social safety nets to protect the most vulnerable workers (e.g., those with modest levels of skills, benefits, and savings). This safety net mending also seems prudent in preparing for a time when there may simply be insufficient numbers of jobs to accommodate those who wish to work. Such a dire scenario, where people are replaced en masse by technology, is not a new prediction (Ford, 2015). It is unclear whether or when technology will make most jobs obsolete (the robot apocalypse), but there are realistic dangers that certain industries, occupations, and geographic locations will see chronic unemployment or underemployment in the years ahead. In fact, such conditions already prevail, albeit on a more limited scale. Witness, for example, poverty zones in inner cities, the dormant coal industry, and the Rust Belt in the United States.

Internal Responses: Adjusting Paradigms and Models of Career Planning

In my reading, the emerging popular and professional literatures on the future of work rarely, if ever, mention career development interventions. Rather, the focus is typically on structural (particularly economic and technological) forces that are reshaping work opportunities and conditions. Such an oversight is, perhaps, understandable. Economists and technologists have their areas of expertise, and career counselors have theirs. It is natural that these fields are inclined to focus on different parts of the problem and to envision different solutions. Ideally, these differing viewpoints can complement one another or be brought into alignment through interdisciplinary or policy efforts. Nevertheless, I think the key challenge for career practitioners and researchers at present is to consider ways they can better help clients to identify and prepare for current jobs, along with the threats to work stability that many clients could face once they enter the workforce.

Career-life preparedness. I have previously discussed the importance of career-life preparedness as a new metaphor or paradigm for the field, one that I think is needed to supplement the time-honored matching metaphor (Lent, 2013). The notion of matching people to jobs has served the field well for over 100 years (Parsons, 1909), dating back to a time when jobs were relatively plentiful, fewer workers were displaced by technological change, and there was less need to engage in skill updating or retraining. That paradigm was also based on the notion that both the person and the environment are relatively stable and predictable—and that the person’s loyalty to the environment, or work organization, will be rewarded with raises, promotions, and job security. Those assumptions now seem quaint, although it is doubtful that they were ever truly applicable to many (or most) workers.

Career-life preparedness involves

a healthy state of vigilance regarding threats to one’s career well-being as well as alertness to resources and opportunities on which one can capitalize. Most important, preparedness can lead to the use of proactive strategies to manage barriers, build supports, and otherwise advocate for one’s own career-life future. . . . [It] encourages a focus on anticipating, coping with, and, to the extent possible, bouncing back from adverse work-life events. (Lent, 2013, pp. 7–8)

This approach is compatible with theoretical orientations, such as SCCT and life designing/career construction (Savickas, 2013), that see humans as active

agents who are capable of forethought, planning, and some measure of self-management. By focusing on preparatory skills and coping strategies, it adds a more active, behavioral emphasis to a view of adaptability that highlights positive attitudes or traits (Lent, 2013).

Of course, at some level, the notion of career construction presupposes that there are careers available to be constructed and that people can author a life story that enables them to navigate their way around at least some structural hurdles. This is not a criticism of the agentic view per se because all career planning is predicated on assumptions about people's ability to accommodate environmental realities and to (partly) shape opportunities. One strength of the life-designing perspective is its emphasis on the interface of work and nonwork life pursuits. Indeed, the wisdom of diversifying one's life commitments is well captured by the observation that "work won't love you back" (Hobfoll & Hobfoll, 1994). Investments in nonwork relationships and activities offer valuable ways to enrich one's life, buffer work setbacks, and seek life meaning outside of (as well as within) one's work (Savickas, 2017).

Preparedness interventions. Of course, paradigms can build on, rather than replace, one another. We can view them as successive layers, where preparation for life design—altering events can augment the matching of self to an occupational path and the construction of career/life plans that typically assume either a relatively benign or neutral environment. Given increasingly uncertain economic forecasts, however, it may be most useful to plan both for optimal outcomes (e.g., via career counseling as usual) and for unexpected or unwanted ones by adding a preparedness dimension to career interventions. The goal of this dimension is to promote resilience or adaptability in clients—a mind-set and behavioral tool kit that will enable them, as much as possible, to withstand stormy career weather and, whenever necessary and possible, to engage in career *re*construction.

My view of preparedness promotion is tied to the relatively new social cognitive career self-management model (Lent & Brown, 2013a) and is largely compatible with other career theoretical orientations, such as life designing, as well. Applications of SCCT's earlier choice model to counseling, like career choice counseling models generally, implicitly assume a matching focus on identifying school and work options in which clients may find satisfaction and success, at least in the near term. A preparedness overlay to career planning and choice counseling would add a longer term focus on prospects for work instability or job/career change that are due to either personal choice (e.g., a desire for career renewal) or external presses (e.g., job loss owing to automation or outsourcing). In addition to anticipating such events—and to viewing them as increasingly normative—a preparedness orientation would focus on the marshaling of (material, social, and emotional) supports and coping strategies to negotiate change, whether such change is welcome or not.

Preparedness activities can be embedded in virtually all career interventions or can constitute stand-alone programs. Because of their psychoeducational and preventive focus, it may be efficient to offer preparedness methods in group (e.g., workshop), classroom, or online training formats, with activities that are geared to the developmental level of students or workers. Below, I offer two brief intervention examples. The first assumes the context of individual or group counseling for career choice prior to work entry; the second assumes a preventive group format for midcareer workers. In either case, many of the same educational elements can be used or adapted.

Counseling for career choice. A general preparedness goal in career choice counseling might be to exchange the common assumption about preparing for a stable career for one of preparing for continuous (or periodic) career change. Thus, in addition to identifying a preferred current choice option and, ideally, assisting the client to implement it, a preparedness agenda may involve focusing on how this career path could change (e.g., because of automation) and how one might either change along with it or pursue a Plan B, or alternative, path. In other words, rather than treating the prospect of career (or self-) change as nonnormative, unlikely, or even alarmist, counselors can convey the message that such change can often be expected and may, in fact, be more common in certain fields than in others. Although denial may have its advantages in some contexts, it is unlikely to be useful over the long haul in career planning.

Career choice counseling of all theoretical stripes relies in part on career information gathering, one aspect of which involves attention to occupational outlook projections. Such projections are readily available online via, for example, the O*NET (e.g., www.mynextmove.org) and *Occupational Outlook Handbook* (www.bls.gov/ooh) websites. Although counselors vary in terms of how much they emphasize outlook data with their clients, a preparedness focus would consider these data just as essential as, say, interests, job tasks, or training requirements—because they provide an empirically based indicator for anticipating stasis or change in particular occupational paths over the foreseeable future. It is noteworthy that occupational outlook forecasts by the U.S. Department of Labor have tended to be fairly accurate over time (Gore, Leuwerke, & Kelly, 2013), thus offering a valuable preparedness tool for clients and counselors.

Frey and Osborne's (2013) work offers another potentially useful source of information, specifically relevant to the potential effects of automation on various occupations. These authors constructed a listing of 702 occupations, based on O*NET data, that are estimated to vary in terms of the likelihood (from less than 1% to 99%) of being overtaken by computerization in the next decade or two. Frey and Osborne's analysis suggests that about 47% of current jobs in the United States—including many in transportation and logistics, office and administrative support, production, and service positions—may be at risk during this time frame. Their methodology is not without its limitations, as acknowledged by the authors, and the accuracy of their predictions cannot be evaluated in the short run. Frey and Osborne's list was also not developed explicitly as a career counseling tool. Still, counselors may wish to consult it and related resources (e.g., Autor et al., 2003) and consider their potential value for clients considering particular choice options. Such information should not be considered a crystal ball, but it at least offers an empirically based perspective on how technology has already affected many occupational fields (Autor et al., 2003) and may affect additional fields in the foreseeable future (Frey & Osborne, 2013). Clients who are disappointed in the predictions involving fields in which they are interested could be encouraged to seek additional information that may either confirm or refute Frey and Osborne's data (e.g., speaking with job incumbents or managers)—or that may suggest ways that one can work with, or add value beyond, technology in these fields, thereby promoting preparedness.

Occupational outlook data may be particularly useful for clients who are drawn toward options that have unfavorable projected outlooks or that involve tasks that may be prey to advancing technology. Many less experienced clients, hearing “follow your passion” or “calling” messages in the media or from significant others, may be ill prepared to consider the likelihood that

their prized career option may be vulnerable to automation or other threats. The goal with such clients can be to help them, to the extent possible, to “robot-proof” their career choices rather than to actively discourage certain options or to circumscribe them only to relatively “safe” fields. In many cases, that could mean considering specialties within a larger field that are relatively less likely to be vulnerable to technological replacement. At the very least, however, it could mean anticipating—and making backup plans to cope with—work instability.

It is a popular misconception that only science, technology, engineering, and mathematics (STEM) fields or knowledge workers will be robot-proof in the future. The “bright outlook” careers currently highlighted on the My Next Move website represent fields that are projected to grow rapidly, have relatively large numbers of openings, or reflect new and emerging career directions over the next few years. A cursory examination of these fields indicates that they include careers that range across Holland themes. Presenting this list to clients can demonstrate that at least some bright outlook options are likely to relate to their interests and other aspects of their work personality. Another nice feature, particularly for clients who do not necessarily wish to earn a postsecondary degree or who are considering a career change, is that bright outlook listings can be sorted by fields for which apprenticeship training is available. Two caveats about the use of occupational outlook data, however, are that (a) all projections are necessarily time limited and (b) projected opening data are only a proxy for information about the future technology landscape. Particular occupations can be subject to supply and demand forces apart from automation, robotics, and so forth.

An SCCT-based approach to career choice counseling typically includes creation of a decisional balance sheet that lists the positive and negative consequences of various choice options (Brown & Lent, 1996; Lent, 2013). This listing follows the gathering and comparison of self-assessment and occupational information. Rather than containing fixed dimensions, balance sheets are ordinarily built around outcomes of subjective importance to the client (e.g., potential to have a balanced family life, earn a high salary, live nearby one’s parents, or do work that contributes to one’s community). Although this client-centered focus may be principled, concerns about the long-term viability of certain jobs or career paths suggest that it may be useful for counselors to include occupational outlook projections as a fixed dimension in all balance sheets, whether or not this was a consideration initially generated by the client. Clients are free to weight this dimension as they wish, but one can argue that it is an increasing professional responsibility on the part of counselors at least to orient career choice clients to such information.

Finally, popular press advice for career planners often extols the “weak-tea conventional wisdom” (Mishel & Bivens, 2017, p. 4) of simply getting better education, retraining, or entering a STEM field to remain competitive. Such overly general advice ignores certain realities—for example, that not all people have proclivities toward Realistic or Investigative themes (Holland, 1997) and that those without clear interests or skills in these areas are unlikely to transform themselves into computer engineers through sheer force of will. At the same time, many types of skills can be cultivated, and individuals who demonstrate facility with both technical and interpersonal (e.g., communication, leadership) capabilities are seen as likely to retain value even in fields where more routine tasks are being taken over by technology. Friedman (2016) referred to these as “stempathy” skills, implying that human skills and qualities are needed to augment computer algorithms in many fields, such as health care.

Interventions for career optimization and continuing employability. Adult workers often seek assistance with such work issues as career dissatisfaction, boredom, performance problems, shifts in interests, expected job changes, or unexpected events (e.g., layoffs due to automation or outsourcing). Although individual counseling can be an excellent option for dealing with such issues, the developmental nature and relative predictability of some of them make them possible targets for group and preventive interventions. Such interventions may fit into two broad categories: relatively routine career renewal (e.g., directed at optimizing one's career functioning or satisfaction) and nonroutine emergency planning.

In my earlier article on career-life preparedness, I suggested a number of activities that can be used to promote career renewal (Lent, 2013). Examples include intentional efforts, where possible, to update one's skills and to expand one's interests (e.g., refining technical skills, seeking leadership opportunities); enriching one's current job by negotiating to take on more agreeable tasks; writing an ideal job description and considering the parts of it that could be implemented, either on one's own or with support; and engaging in organizational citizenship and generative activities, such as mentoring more junior colleagues, which, in addition to their intrinsic rewards, can add value to one's work unit and, thus, attract extrinsic rewards.

Of course, although career renewal or optimization are viable goals for some workers, others (particularly more precarious workers) may not have the flexibility or support to pursue them. Some, in fact, may be facing long-term job loss (e.g., taxi drivers because of automated cars) or imminent layoffs (e.g., manufacturing workers because of robotics advances or offshoring). Rather than waiting for the axe to fall, counselors could provide emergency preparedness interventions that assist workers, regardless of their current job security, to plan for unwanted or traumatic work events. These could run the gamut from helping workers to anticipate relatively less threatening barriers or rainy day events (e.g., failing to get a hoped-for raise or promotion) to major setbacks. The focus would be on anticipating event likelihood; preparing strategies, resources, and supports to deal with the most likely events; fostering a sense of coping efficacy to aid perseverance under stressful conditions; and developing backup plans in case one's preferred plan is unattainable or insurmountable obstacles materialize (Lent, 2013).

It may be particularly useful for many workers to anticipate higher level threats to their employment before they occur, that is, at a time when secondary prevention strategies can be developed to reduce their adverse impact. This may be likened to preparing a figurative escape plan or emergency kit (Lent, 2013). Such an approach could, for example, be based on envisioning what-if scenarios. For example, what would clients do if they were to lose their job next year, or next month, or tomorrow? To whom would they turn for emotional or material support? Which people in their personal and professional support systems could help them to network for new jobs? How long could their personal or family financial resources enable them to remain unemployed without dramatically changing their living circumstances? What sort of belt-tightening would be needed either immediately or eventually? Although cognitive behavioral counselors often pose what-if scenarios largely to help lessen the imagined negative consequences of certain events, the goal here is primarily to identify possible events, consider their likelihood of occurrence, and plan coping strategies, especially for those events that seem most likely to occur.

Such what-if questions are probably unpleasant for most people to consider and, thus, are likely to be avoided under ordinary circumstances. Yet, because of the dramatic changes in the workforce that have already occurred, and projections by some that such changes will continue and even accelerate, posing such questions, and grappling with the answers, may enable workers to buffer themselves and their families from the worst effects of anticipated and even unanticipated job loss. The potential import of this approach is underlined by research indicating just how close to the financial edge many Americans may be. For example, using data from the 2009 TNS Global Economic Crisis survey, Lusardi, Schneider, and Tufano (2011) examined households' financial fragility, focusing on their capacity to come up with \$2,000 in 30 days. They reported that over 40% of respondents indicated that they either could not do so or would need to sell or pawn possessions or take payday loans to do so. These findings are sobering. Such surprise expenses (e.g., due to medical needs, unexpected repairs, or job layoffs) can be readily envisioned and, thus, prepared for. Those who are the most financially fragile (e.g., the unemployed, those with limited educational attainments and financial knowledge) may need the most assistance in preparing financial coping methods, including learning (in advance of crises) how to access local resources to weather temporary financial storms.

Once clients develop their escape plan or emergency financial kit, they can be encouraged to update it periodically (e.g., once per year). Career and financial professionals can assist with the initial plan and also be available to consult when it needs updating. Although I have framed career renewal and emergency preparedness as good candidates for preventive and group interventions, there may be instances where they are best dealt with in the context of individual counseling (e.g., where emotional upset over anticipated or actual job loss is relatively severe or unwanted job changes seem imminent). Whether interventions are delivered proactively or remedially, the essential focus would be on identifying potential barriers to employment or career progress, developing coping strategies to do deal with those barriers, and marshaling necessary supports. Where job changes are necessitated by automation, and especially where retraining is being considered, it may be especially important to consult occupational outlook data so that workers might consider options that are relatively less likely to be vulnerable to technological change in the near future (see Frey & Osborne, 2013), thus potentially minimizing the need for constant self-reinvention.

External Responses:

Advocacy, Educational Reforms, and Social Safety Nets

In addition to the adjustments we can make to our metaphors and models of career intervention, the career development field, especially through its major organizations, such as the National Career Development Association (NCDA), can have an important impact through advocacy, particularly in advocating for public policies aimed at shoring up social safety nets for precarious workers and those likely to be replaced by technology in the years ahead. Although many displaced workers will find alternative forms of employment in the near future, the worst case scenario is that a time may come when there is simply not enough work to go around in ever-increasing pockets of the country. The more pessimistic estimates are that automation may disrupt roughly one third (Paquette, 2017) to one half (Frey & Osborne, 2013) of American workers over the next decade or two.

Although these estimates may suggest that the effects could be distributed somewhat democratically, those with fewer resources or lower level skills may fare more poorly than other groups.

Economists and government planners have considered a number of safety net options. These include a guaranteed minimum income, various tax schemes (e.g., a negative income tax), and government-provided work assignments. Briefly, a guaranteed minimum income would provide a modest fixed stipend to every citizen. It would ensure that all individuals can afford basic necessities, and it might replace such current programs as welfare assistance, food stamps, and unemployment insurance. Part of the rationale is that, by offering an income cushion, career changers and displaced workers could be enabled to seek retraining or entrepreneurial opportunities, which, if successful, can later augment their guaranteed incomes (Ford, 2015). A negative income tax would provide a stipend only to individuals earning below a preset income level. In contrast to such income-only concepts, government work assignments would, as in the days of New Deal programs such as the Civilian Conservation Corps, provide paying jobs to unemployed people. Other creative solutions have also been offered, such as a “robot tax,” championed by Bill Gates, wherein businesses replacing workers with automation would pay taxes linked to the salary of the displaced workers (Clifford, 2017). Such a tax could then be used to support alternative forms of employment or a guaranteed minimum income.

A thorough review of the advantages and disadvantages of these and other economic support schemes is beyond the scope of this article. However, it is clear that these programs would be expensive for governments to support and would undoubtedly meet with contentious political debates. As a result, they likely will constitute last-resort strategies if or when economic conditions become dire either at a national or regional level. Examples of such conditions would be a prolonged economic depression or a major tipping point in the replacement of human workers by technology. Although these programs may not become serious options for some time, it would be beneficial for career development professionals to become familiar with the most commonly discussed income replacement options and for the NCDA and other professional groups to develop lobbying positions well in advance of economic crises—which, again, by some accounts, may not be very far off.

On the basis of my own reading, I find the government-provided work option to offer the most promise for several reasons (see Brynjolfsson & McAfee, 2014), leaving aside questions of how to finance it. First and foremost, it would provide work and not just an income. As is well documented, many people derive a key sense of meaning, purpose, life structure, and social connectedness through their work (Lent & Brown, 2013b). Unemployment is also associated with mental health problems (Blustein, 2006), high crime rates, homelessness, and other indicators of community dysfunction (Brynjolfsson & McAfee, 2014). Therefore, an income replacement option that includes the provision of work is likely to cover a number of important bases beyond economic survival alone.

Second, because work assignments have been used effectively by the U.S. government during the Great Depression, they may prove more politically viable than options that rely only on untried tax policy changes. Third, such options may enable government planners to address infrastructure and other needs (e.g., health care assistance for older adults, environmental projects) at the same time that unemployment is being addressed. Parenthetically, career development personnel could assist with the matching of individuals

to job needs and also develop programs focusing on the transferability of work tasks to nongovernment jobs. These considerations do not obviate the huge potential for controversy that this or any income replacement option may encounter, but, again, from a career development perspective, work assignments may offer more upside than most of the available options.

Another advocacy-related path involves educational reforms and innovations that assist students, and workers undergoing retraining, to obtain valuable work experience that can assist in the transition from school to work or from job to job. For example, experiential education activities, such as internships, undergraduate research, and cooperative programs (which include paid work experiences), offer students valuable opportunities to develop hands-on skills that may boost their employability. Such programs are currently available at many secondary schools and universities but may represent an increasing trend in the future (Aoun, 2017; Selingo, 2017). Other programs offering flexible, work-focused training and lifelong education options through community colleges, work organizations, or large-scale online platforms also represent innovations that are likely to grow rapidly and offer increasingly viable alternatives, or adjuncts, to 4-year college degrees (Friedman, 2016; Selingo, 2013). Naturally, the value of retraining programs is predicated on the assumption that the new jobs for which workers are being prepared are, in fact, available and that they will remain viable over the foreseeable future.

Career development professionals, particularly those employed in educational settings, may be in a good position to assist in the development of work-based educational options while incorporating research and theory on the promotion of interests and skills (e.g., Brown & Lent, 1996). At an organization level, NCDA and other work-oriented professional associations can play key advocacy roles in the further evolution of education-to-work transition structures. Such advocacy may help to forestall large-scale unemployment owing to technological displacement by providing opportunities to prepare students (or to retrain workers) for entry into fields that are projected to grow in the foreseeable future. In addition, discussions can be sought with the Bureau of Labor Statistics about ways to further enhance its career information platforms, for example, by providing more detailed analyses of how various occupations may be affected by technological advances in the near term (see Frey & Osborne, 2013).

Implications for the Careers of Career Service Providers

Those who provide career services also need to plan for and manage their own careers. On an optimistic note, counselors and psychologists generally fare well in terms of projected demand and relative safety from technological replacement (e.g., Frey & Osborne, 2013). Although computers and the internet can deliver career information more rapidly and comprehensively than career counselors alone, counselors possess the human skills to help clients make sense of this information, incorporate it into an evolving sense of self, arrive at a reasonable choice, and marshal the social and other resources needed to implement it. As with Friedman's (2016) stempathy skills, by developing expertise in high-tech (e.g., use of technology to perform self-assessments and gather career information) as well as high-touch (or helping) domains, counselors are well positioned to continue to add value to the career choice process for the foreseeable future.

At the same time, big data and sophisticated algorithms are likely to make increasing inroads into the process of career planning, for example,

with people's digital footprints being used to inform their career-relevant and other major life decisions. In a fascinating recent study, Wu, Kosinski, and Stillwell (2015) used the Facebook "likes" of a large number of volunteers to predict the users' responses to a personality questionnaire. The likes were based on users' expressed preferences for a variety of content, such as activities, books, and websites. The like data were compared with the responses of human judges, who knew each participant, in terms of accuracy in predicting the participants' Big Five personality traits. Wu and colleagues found that the accuracy of computer prediction grew steadily with the available number of likes. In fact, computer models needed only 10, 70, 150, and 300 likes, respectively, to outperform the average work colleague, friend, family member, and spouse. In addition, the likes were predictive of a number of life outcomes, including (of particular relevance to career planning) participants' reported field of study.

Along with other writers (e.g., Harari, 2017), Wu et al. (2015) speculated that people may come to rely increasingly on algorithms that monitor their online behavior to help them make important life decisions, such as choosing career paths. They also pointed out the advantages that computers can have in this context—for example, in terms of storing vast amounts of data, generating consistent algorithms, avoiding humans' motivational biases, and gathering relevant data as part of one's digital footprint, without the need to complete additional personality measures. Conceivably, other data of relevance to career planning (e.g., values, interests, certain abilities) can also be gathered incidentally as part of people's online behavior. Of course, such developments also raise concerns regarding how people's digital footprints can be used by social networks, search engines, or other entities—in particular, who owns these data and how can they be safeguarded to protect individuals' privacy and prevent unauthorized uses?

"Chatbots," which use artificial intelligence to simulate human dialogue, are currently being offered as tools for life coaching, companionship, and mental health support (Nutt, 2017). They could conceivably be designed as career planning aids that, for example, help users to interpret assessment results, check on their progress at gathering career information, and assist in the comparison of different career options. Many users may like the convenience and on-demand availability of chatbots, despite knowing that the personal attention they are receiving is not really being provided by a person. Thus, such technological supports may be able to assist with some of the more routine aspects of career planning/change, while human service providers might then have more time to help with particular decisional difficulties or with more complex career problem scenarios (e.g., depression, relational tensions, job search struggles following job loss). In this scenario, there would be a place for both automated and human career services, along with a need to coordinate them. Of course, there will also be a need for ongoing research to determine the efficacy of automated or partially automated career services relative to human service delivery alone. Existing research suggests that career counselors still offer substantial benefits beyond computer-guided programs (Whiston & James, 2013; Whiston, Li, Mitts, & Wright, 2017), which is not surprising given the advantages that human workers still hold in tasks requiring creativity and social intelligence (Frey & Osborne, 2013).

Conclusion

Career development professionals and vocational psychologists are paying increasing attention to projections about how the world of work may be fundamentally transformed by advances in brilliant technologies (e.g., Blustein et al., 2017; Hirschi, 2018; Savickas, 2017), including automation, artificial intelligence, robotics, and fabrication (Brynjolfsson & McAfee, 2014; Ford, 2015; Friedman, 2016; Gershensfeld et al., 2017). As others have recently noted, these technological advances can have both positive and negative consequences for workers. On the positive side, they may help to reduce or eliminate many boring, dirty, and dangerous tasks, while creating new, well-paying technology-based jobs; opportunities for entrepreneurs; and flexible, freelance work. On the negative side, they have the potential to eliminate more jobs than they create and to reduce the earning potential for many low- and middle-skilled workers (Friedman, 2016), exacerbating concerns about wealth disparities and an upsurge in the precariat (i.e., poorly compensated workers who lack a substantial safety net).

In this article, I have suggested that it is not clear how swiftly or in what directions these technological winds will blow, but that a preparedness stance may be wise for our field. Two general strategies, in particular, may be pursued: (a) external advocacy, public policy, and educational reform efforts that are aimed proactively at buffering workers against the negative economic, social, and emotional consequences of technology-induced obsolescence and (b) internal innovations in our paradigms and methods of career intervention so as to help students to prepare for the new technological landscape and to aid workers to adjust to it.

In discussing internal changes to our paradigms and methods, I have speculated about the value of adding a preparedness dimension to interventions aimed at career choice, renewal, and optimization. These ideas require empirical test, suggesting new directions for career research, namely, the design and evaluation of interventions to promote career-life preparedness. The social cognitive career self-management model offers one template for studying the antecedents and consequences of career preparedness goals and actions and, by extension, for developing theory-based interventions. Other theoretical approaches, such as career construction (Savickas, 2017) and the psychology of working perspective (Blustein et al., 2017), may also offer fruitful bases for helping career clients to prepare for, and adapt to, a work future that may be both ripe with opportunity and fraught with instability.

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