A NEW WORLD IS EMERGING AT BREAKNECK SPEED AS TECHNOLOGY SHAPES — AND SHAKES — THE LIVES WE LIVE AND THE WORK WE DO. AS TECHNOLOGY EVOLVES, LINK ASKS: WHAT IS THE FUTURE OF WORK?

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THERE’S A FUNDAMENTAL SHIFT happening all around us. Human progress (assuming we can still call it that) is branching out from the familiar, linear path of natural evolution. Technological breakthroughs are spawning spinoff breakthroughs at a dizzying rate, reconfiguring our basic assumptions around core values like education, employment, privacy, social norms and even mortal limitations. Whether we embrace it or not, technological innovation is augmenting our reality.

Both the nature of work and the workforce itself are in for radical change. The notion of job security is already becoming a construct of the past and soon it will be a distant memory, like the 40-hour workweek and employer-funded pension plans. Serial employment is fast becoming the new norm as companies tap into specialized talent on demand. In-demand workers transition from one job to the next, refreshing their skill sets between every contract to avoid turning up for work and discovering their skills are obsolete. Lifelong learning, flexibility and adaptability are critical to success. Competition is tougher than ever. The threat of automation is real. Digging in your heels will only get you stuck. Prepare to be nimble, or bust.

Clearly it’s not the first time huge swaths of people have had to rethink their livelihoods; to redefine their purpose, their skills and their priorities in the wake of progress. Three industrial revolutions over the span of the past 250 years have led to where we are today.

The first started in the late 18th century with the advent of steam power and the mechanization of production and factories. When new energy sources emerged at the end of the 19th century, the Second Industrial Revolution kicked off. It was underscored at the start of the 20th century by the invention of

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If the future brings us less time spent working, how might leisure time change?
As a travel professional, I could see the increase of leisure time as a positive for the travel industry. There would be more time to explore new countries and cultures, resulting in a more worldly, tolerant and educated society.
the electric-powered assembly line, which introduced mass production to feed growing consumer appetite. The third revolution appeared during the last half of the 20th century when electronics, microprocessors and computer-generated information technology enabled the automation of production lines.

Less than two decades into the third millennium, we’re already well across the threshold of the Fourth Industrial Revolution, flexing technological superpowers to influence what activities are performed, how and by whom (or what) across every industry in every country around the planet. Mobile and global connectivity, rampant digitization of information, and a plethora of compounded data and knowledge are driving our technological capabilities forward at warp speed. Innovation is seeding innovation.

Disruption doesn’t begin to describe where all of this is leading.

Robots and automation in commercial manufacturing and packaging plants have proven consistently effective at completing precise, repetitive tasks quickly and continuously without complaint, fatigue or injury. The potential applications continue to expand. The recent rollout of self-driving trucks in Alberta’s oil sands has ignited debate on the superiority of automation over the human labour market. And as automation ramps up in the pursuit of improved workplace safety and bottom line efficiencies, jobs that are people’s livelihoods are doomed to be eliminated. We may not like it, but we understand it and we’ve seen it coming for some time. It’s what might happen next that could throw us all for a loop.

Robots are maturing, diversifying and endearing themselves to society. Endowed with artificial intelligence (AI), measurement sensors and process control transmitters, they’re fanning out, embedding themselves into our everyday lives and, in some cases, reporting back on what we’ve unwittingly taught them. Limited only by imagination and consumer appetite, the spread and application of robotics and automation appear unstoppable. In various parts of the world robots already patrol inside shopping malls (drones patrol the perimeters), comfort sick children in hospital, deliver room service at swanky hotels, and tend to the elderly and the infirm. Enamoured by their capabilities and increasingly affordable price points, more and more of us are welcoming these smart devices into our homes to vacuum our living rooms, mow our lawns, empty the

Can the hand of a robot simulate the empathy of human touch?

In the future we will surely have AI that can convincingly mimic human speech and empathy, as well as robotics that can simulate, in very exact ways, a gentle human touch. What will always be missing, though, is the deep intrinsic knowledge that a living, caring human being is behind that touch, no matter how gentle or well-programmed. And that, after all, is where the sense of comfort truly comes from. The answer for me is, “No.”
The thing is, AI-imbued robots are high-performance machines. Given the necessary coding and algorithms, they have the capacity (called “machine learning”) to analyze feedback, predict outcomes and continuously improve upon their performance without human intervention. They’re adept at facial recognition, lip reading and, increasingly, deciphering body language. Some are preparing to conduct job interviews. If machines can mentally out-perform people, then workers in skilled knowledge fields such as accounting, law, insurance, medicine, engineering and education are not as immune to automation as they once thought they were.

And that’s just the tip of the iceberg. If machines commandeer one task after another formerly held by the thinkers and doers of this world, what opportunities will people have to make a living, and what role, if any, will we have in shaping the future of civilization? Are we innovating ourselves towards obsolescence as a species?

“Artificial intelligence is more important than fire.” That’s what Google’s CEO Sundar Pichai told the world at the 2018 World Economic Forum in Davos, Switzerland. He wasn’t exaggerating. We’re brandishing a colossally powerful tool with the capacity to either advance the human condition for everyone the world over or, if we’re not careful, eradicate humankind. The choice — at least for now — is up to us, because it’s people who build the algorithms that run the machines. We’re still in charge. It’s people who drive change.

Leonardo da Vinci lived from 1452 to 1519. Although he’s revered as a Renaissance artist, he was truly a Renaissance man, with profound interest in many areas including anatomy, physics, nature, mechanics and aeronautics. His working notebooks contain detailed specs and illustrations of futuristic inventions like the bicycle, the helicopter, a submarine and even a military-style tank. A true visionary, his ideas were far ahead of his time. Society had neither the need nor the resources for such things. As a result, in his time, da Vinci’s imaginings didn’t go any further than the page.

The da Vinci example is one that Sonia Perna and Terry Davies reference when they teach Technology and Science in Society, a third-year business course at SAIT. “We look at how social needs and scientific knowledge drive change, “ says Perna. “If we have the will, the resources and a social need for it, we can use technology to make things better.”

We’re doing that all the time and in countless ways. Technological innovations have ushered in a wide range of timely new products and services designed to make the things we have to do (such as pay bills, navigate roadways, monitor our health) and the things we want to do (be entertained, take photos, share everything) a whole lot easier.
our workloads lighter (automation, teleconferencing) and our hours of work more flexible (remote offices, time-tracking software).

“We definitely drive the change, but technology also affects our thinking and how we operate,” says Perna. Mobile connectivity has exposed us to global opportunities, cultures, ideologies and injustices, empowering us to sample, learn, question, tell, and champion change for the betterment of people and the planet at large.

“Technology has given people a global platform,” says Davies. “A lot of the environmental movement and changes that have been made in products and manufacturing are a result of grassroots activities.” Our connectivity has awakened a global consciousness — and a heightened social conscience.

Consumer behaviour and expectations have shifted in this new global economy. Expanded consumer choice affords greater discretion. Informed decision-making requires transparency. The fair trade, sustainable and ethical procurement movements are evidence that we don’t just want more from the companies we choose to do business with; we expect more. We expect better.

To earn our trust and our patronage, companies have to show they’re reaching out to make a positive difference in the world at large. We want to hear how they practice sustainable farming, provide clean drinking water to global communities in need, invest in green energy, train disenfranchised women to run successful businesses, or promote human rights in their foreign operations. We’ve started to judge a company’s performance, at least in part, on its social values. Demonstrative social responsibility has become a competitive edge in the marketplace.

There’s a shift happening in the value our society hopes to realize from the labour market as well, though it’s dramatically different depending on whether you’re a worker or an employer.

Workers, and this is especially true of the younger generations, expect more from their jobs. “They’re looking for different things from work at the end of the day compared to previous generations,” says Davies. They expect to have more say over what work they do, how they do it and who they do it for. They want rewards that go beyond a cheque to pay the rent. “They want to be engaged. To be part of the decision-making process. To do work that’s meaningful,” Davies says. And if it turns out the job isn’t all that? “They’re more comfortable just walking away.”
Retaining good employees depends on keeping them engaged and satisfied, and that is the biggest challenge facing today’s employers. Kristina Grubor teaches a SAIT course called Society and the Workplace. “The old way of telling people what to do and expecting them to obey no matter what is dying out,” says Grubor. “We need to figure out a new way to successfully manage people. We need a new managerial paradigm.”

In the meantime, temporary employment is fast becoming the norm as both workers and employers turn to the open talent job mill in place of any long-term commitments to one another. Employers are filling project-based contracts using digital platforms that provide access to global mobile talent on demand. Workers are posting to those platforms, hoping to stand out within the increasingly competitive market. Landing a job or a contract, and then another, is the end game. There are no office hours, no employee benefits, no unions, no job security or social safety nets. Following the earlier industrial revolutions, such piecemeal employment became widely recognized as worker exploitation. Today it’s often disguised as an opportunity to realize work-life balance, freedom and flexibility.

As more and more in-house jobs roll over into automation, or come under the purview of AI, and as more companies divvy up full-time positions into contract gigs they can outsource to the global labour market, precarious employment will only continue to grow.

If we are to expect better from the future of work, we’d do well to decide — right now — what a “better” future really looks like, for all of us.
So a great many jobs are being usurped by do-it-themselves mechanizations and smarter-than-the-rest-of-us AI. We know we’re on the threshold of a technological takeover that will have a significant impact on our ability to earn a living. It’s happening now. It’s happening to us and, let’s be honest, for the most part because of us. Now what? What can we do to escape obsolescence in the workforce?

We need to limber up. The traditional career path of days gone by was linear. It mostly involved setting our bearings and following along a continuous trajectory. Whether Point A was an apprentice on the shop floor or a student in a lecture hall, we knew that, in all likelihood, if we could just stay the course we would eventually get to Point B. The future of employment is going to involve a lot more letters of the alphabet.

Manoeuvring successfully between jobs will require adaptive flexibility with the onus primarily on the individual to remain relevant in a marketplace that’s prone to rampant change. The younger generations are inherently adept at adapting. They’ve been doing it forever. “There’s going to be a lot more opportunity for people to create their own paths,” says SAIT instructor Sonia Perna. “I feel like students are prepared for, and maybe even welcome, that.”

On a larger scale, SAIT President and CEO Dr. David Ross works to ensure the Institute is also prepared to adapt. He meets regularly with industry and community leaders to gauge their needs for skilled workers. During one recent round-table meeting dedicated to the future of work, Calgary Foundation CEO Eva Friesen talked about the difference between finding a job and making work.

“Jobs that existed when I was in school don’t exist anymore, and now there are different jobs,” she tells LINK. “I encourage my own daughters not to think, ‘Who has a job out there for me,’ but rather, ‘What work needs doing that I want to do, and that I have the skills to do? And how do I turn that into my job?’”

It can be empowering for people to use today’s technologies to design for the future and to create work. We’re already seeing this kind of bottom-up, solutions-driven innovation with the proliferation of things like crowdfunding and mobile app development. Much of the existing technology is user-friendly. Everything else will just have to be learned.

Learning will necessarily entail a life-long endeavour. Ongoing interest in bettering oneself is known to correlate to individual success but, moving forward, purposeful, lifelong learning will be compulsory. Those who keep up will keep pace with change. Those who fall behind will be left there.

Exactly what areas of study will best prepare generations of workers for optimal success in the future is open for debate — and there is considerable debate.

The general consensus is that soft skills such as change management, collaboration, complex communication,
FOURTH INDUSTRIAL REVOLUTION (RIGHT NOW): “... new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human.” — PROFESSOR KLAUS SCHWAB, FOUNDER AND EXECUTIVE CHAIRMAN, WORLD ECONOMIC FORUM

China leads the world in testing the 5G wireless network, necessary to expand the Internet of Things.

Ubiquitous Energy is developing transparent solar panel technology that converts light waves into electricity and replaces window glass.

Microsoft’s HoloLens — a mixed-reality computer headset that combines holograms with digital content — is now available in 41 countries.

Pop.Up Next is a passenger drone being developed by Audi, Italdesign and Airbus that combines self-driving vehicles with aerial transport.

The Self-Assembly Lab at MIT’s International Design Centre is pioneering programmable materials that change shape in response to energy sources such as temperature, moisture, light or vibration.

critical/abstract thinking, creativity and the ability to work in diverse environments will be essential for success in the future of work. It’s believed these people-focused competencies will give us a competitive edge over our automated counterparts while helping us work productively with one another. There’s some question as to whether we can actually teach creativity. Perhaps the focus needs to be more on recognizing creativity when it appears and knowing how not to quash it.

The growing need for technically savvy individuals to write code and algorithms is obvious, if overstated. Even if we all had the will and the aptitude for such work, we couldn’t possibly all find gainful employment doing it.

We know large parts of customer service across various sectors (think banks, grocery stores and hotel bookings) are already being automated or transitioned to online, self-serve platforms. Jobs that disappear this way are not expected to reappear.

We know advancements in AI are only just beginning to hint at their potential to disrupt traditional knowledge fields like accounting, law, medicine, engineering and education. As machine learning harvests, manipulates, learns from and repurposes the expansive knowledge reserves contained in digital information data banks, AI will eventually catapult machines far beyond the physical and mental capabilities of mere mortals. With any luck, there will be opportunities for human collaboration.

We know the trades are leveraging technologies like 3D printers, drones, nanocarbon tubes and automation to streamline jobs, improve performance and amp up workplace safety. Jim Szautner is the Dean of SAIT’s School of Manufacturing and Automation, where students come to train in non-destructive testing inspection technology. Increasingly it involves using robots, software analytics and a 3D-printed sensor to inspect pipelines and rails without disturbing the integrity of the infrastructure. This emerging approach could eventually replace existing inspection methods but, as Szautner suggests, it’s not the technology in and of itself that’s extremely innovative. “The innovation comes from the application of existing technologies and combining them into a new function,” he says. Technological innovation is essentially advancing the trades, not threatening them. As always, an applied education in hands-on work will have tangible value, even in the future.

We need to rethink our training and education models to bring them into alignment with the reality of fast-paced technological change and the real-time economic demand for talent.

“The kind of companies that are at the frontier need people with this higher-end advanced talent now,” says Nobina Robinson, CEO of Polytechnics Canada, a national association that advocates for polytechnic education. Many of the conventional post-secondary options are “operating very differently from the pace of the economy.” Skills development and training has to be a focus. Robinson sees the kind of industry partnerships and ongoing collaboration that SAIT undertakes with employers, fellow academic institutions and government as important ways of aligning program offerings with labour market demands. But it’s also necessary nationwide. “In Canada we don’t have [broad labour market] signalling systems. We don’t have a national accreditation body. We are not supporting a mobile workforce.”

The sweeping changes Robinson sees as necessary will require action at the federal government level. Since 1867, education (K–12 and post-secondary) has been a provincial mandate. Over time, that has effectively meant that Canada has 13 distinct labour markets. Educational credentials earned in one province may not carry equal weight in all the others. “We can’t change history, but I find it shocking that in 2018 — 150 years after Confederation — we can’t get past the jurisdictional barriers to education and labour mobility,” says Robinson. Given what we know about the future, it doesn’t bode well for us that we’re a nation adverse to change.

Geographic barriers to education are breaking down,
thanks to expanded online learning platforms. Here again, technology is showing us how something we thought could never be done can be, and rather seamlessly at that. Embedded translation software in online study programs is making global communication possible. Self-directed learning in whatever you want, whenever you want it, represents a tremendous capacity to provide and improve education globally.

A lack of academic prerequisites could put advancement out of reach for, say, someone who learned their skills on-the-job and without formal training. A process called Prior Learning Assessment Recognition (PLAR) is available for some courses at SAIT and other post-secondary schools as an avenue to map existing skills and abilities acquired through less formal channels, and to give credit for those skills where appropriate. It validates proven skill sets, saves what would be wasted time and money spent on upgrades, and turns potential obsolescence into the opportunity for meaningful productivity.

As the traditional career gives way to serial jobs, and human tasks are increasingly taken over by intelligent machines, the business of making a living is sure to be remarkably changed from what it is today. Just how central a role we’ll each have in the future of work depends on us — at least for now.

At the individual level, Eva Friesen suggests an entrepreneurial approach. “Getting a job depends on someone else giving it to you, but making work is something you do for yourself — and that needs some self-confidence and belief in yourself that you can do it.”

And for society as a whole? Amid the seemingly infinite opportunities and the relentless disruption, our fundamental challenge may not be whether we can make work, but whether we can make work better — and how.

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