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The Futures of work

Abstract:

The future of work and jobs has become a critical policy area and a frequently heard rallying cry during election campaigns. Politicians and lay public commonly propose simple solutions to the problems of unemployment, underemployment, labour underutilization, mismatch between available skill-sets and job requirements and so on. Globalisation/outsourcing, globalism and foreign labour are increasingly targeted as the main cause of job shortages. Also targeted are international organizations and 'lobbies' as well as (allegedly) incompetent local politicians. There is, however, one significant variable frequently missing in these debates: Automation. This provocation looks at the implications of automation on the futures of work. It offers hints and clues as to the dilemmas ahead, it also takes a deliberately normative approach to questions of 'jobs', 'employment' and 'work' as a good provocation works best with clear and accepted categories.

Biographical notes:

Dr Ivana Milojević is a researcher, writer and educator with a trans-disciplinary professional background in sociology, education, gender, peace and futures studies. She obtained her first university degree in 1992 in the former Yugoslavia (where she was born in 1967) and a PhD at the University of Queensland in 2003.

Since the early 1990s, she has delivered speeches and facilitated workshops for governmental institutions, international associations, and non-governmental organizations in Australia, Asia-Pacific (Brunei Darussalam, Iran, Malaysia, Pakistan, South Korea, Taiwan, UAE, and US-Hawaii), South Africa, and Europe (Croatia, Belgium, Denmark, Finland, France, Hungary, Italy, Serbia, Sweden, Switzerland, and Turkey). She was previously a professor at a number of universities (The University of the Sunshine Coast, Australia (Adjunct Professor, 2009-2015), University of Novi Sad, Serbia (Visiting Professor, 2008-ongoing) and Tamkang University, Taiwan (2015)). In 2016-2017 she led the foresight unit at the Centre for Strategic and Policy Studies, Brunei Darussalam.

Milojević is the author of over seventy journal articles and book chapters, as well as the author, co-author and/or co-editor of a number of academic books. These include: *CLA 2.0: Transformative Research in Theory and Practice* (2015); *Breathing: Violence In, Peace Out* (2013); *Alternative Educational Futures: Pedagogies for an Emergent World* (2008); a special issue of *Futures* on Feminism/Gender (2008); *Neohumanist Educational Futures: Liberating the Pedagogical Intellect* (2006); and *Educational Futures: Dominant and Contesting Visions* (2005, reprinted in paperback format in 2011). She has also co-authored two books in Serbian: *Ko se boji vuka još? Moćne priče za pametne i odvažne* [Who Is Afraid of the Big, Bad Wolf? Awesome Stories for the

Courageous and Curious] (2012) and *Uvod u rodne teorije* [Introduction to Gender Theories] (2011).

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Provocation

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> Advances in robotics, artificial intelligence, and machine learning are ushering in a new age of automation, as machines match or outperform human performance in a range of work activities, including ones requiring cognitive capabilities (Manyika et al 2017 p. iii).

Arguably, any meaningful discussion about the tangled futures of jobs and automation should start with an historical analysis. Concretely, let's start with a case study of William Lee who is remembered in history as the inventor of the first stocking frame knitting machine in 1589 (Millington and Chapman 1989). Excited about all the time and effort this machine is to save, he presented it to Queen Elizabeth I. She allegedly responded: "Thou aimest high, Master Lee. Consider thou what the invention could do to my poor subjects. It would assuredly bring to them ruin by depriving them of employment, thus making them beggars" (Christ's College ND). Cutting a long story short, William Lee died poor and desolate as it took the industry nearly a century to adopt the pattern he invented. The machine he created was the only one in use for centuries and, apparently, its principle of operation still remains in use.

While very few people these days are adamant that they should knit their own stockings, they do, however, believe that they should keep their jobs. As well, they are adamant that more jobs should be created, preferably in the area that they are already skilled in. But here is the thing: a 2013 study by Frey and Osborne (2013) estimates that 47% of workers in the US across 702 occupations are at high risk of automation. Similar figures exist for Britain (35%), Japan (49%), Australia (40%) and ASEAN 5 (Cambodia, Indonesia, the Philippines, Thailand and Vietnam) (56%) (Chang and Huynh 2016; Frey and Osborne 2013; Manyika et al 2017).

In Indonesia alone 1.7 million office clerks are highly vulnerable to automation (Chang and Huynh 2016). Another quick example is the perilous situation of U.S. truck drivers. In 2014, there were 4 million driver jobs in the U.S., 3.1 million of which were truck drivers. 300,000 of them or around 25,000 a month are expected to be replaced by automated vehicles each year (Balakrishnan 2017).

Those of us who are not truck drivers, or are not in manual or routine jobs need not worry right? Well, not so fast. In 2004 Levy and Murnane argued in 'Why People Still Matter' that driving in traffic is insusceptible to automation:

> But executing a left turn against oncoming traffic involves so many factors that it is hard to imagine discovering the set of rules that can replicated a driver's behaviour (cited in Frey and Osborne 2013 p. 3).

In 2010, or barely six years later, Google announced that it had modified several Toyota Priuses to be fully autonomous. This was followed by the automated bus trials in Finland and other automated vehicles tests, including with trucks. Not surprisingly, today's exponential rate of change has shaped at least one 'Catalogue of fears' (Morgenstein 2016) wherein even those in creative industries, such as actors, are seen in terms of 'medium range probability' of being replaced by smart algorithms (See Figure 1). Educators, translators, editors, designers, writers and many others may meet the similar fate.

Catalogue of fears

Probability of computerisation of different occupations, 2013
(1 = certain)

Job	Probability
Recreational therapists	0.003
Dentists	0.004
Athletic trainers	0.007
Clergy	0.008
Chemical engineers	0.02
Editors	0.06
Firefighters	0.17
Actors	0.37
Health technologists	0.40
Economists	0.43
Commercial pilots	0.55
Machinists	0.65
Word processors and typists	0.81
Real-estate sales agents	0.86
Technical writers	0.89
Retail salespeople	0.92
Accountants and auditors	0.94
Telemarketers	0.99

Source: "The Future of Employment: How Susceptible are Jobs to Computerisation?", by C. Frey and M. Osborne (2013)

Economist.com

Figure 1: Catalogue of Fears

All of those people—or all of us—may thus join some 200 Wiki entries under the provocative banner 'obsolete occupation'; the occupations that have already disappeared: Telephone and Switchboard Operators, Typists, Type-setters, Bowling Alley Pinsetters, Human Alarm Clocks, Lamplighter, Factory Lectors, Aircraft Listeners, Elevator Operators, Lady's Companions, and so on. The list of jobs that are currently disappearing is equally long: Meter Readers (water & electricity companies), Travel Agents, Gas Station Attendants, Cashiers, Postmen/Postal Service Mail Sorters/Carriers/Clerks, Film Projectionists, Farmers/Ranchers/other Agricultural Mangers, Agricultural Workers, Fast-food Cooks, Sewing Machine Operators, Data Entry Clerks, Door-to-Door Sales Workers, Street Vendors, Electrical and Electronic Equipment Assemblers, File Clerks, Pre-press Technicians/Workers, and the list goes on. "We are just seeing the tip of the iceberg. No office job is safe," said Sebastian Thrun (Morgenstein 2016), an AI professor at Stanford and co-founder of Udacity, whose efforts may have already helped minimise the number of jobs for the university lecturers.

Indeed, Frey and Osborne suggest that:

> …sophisticated algorithms could substitute for approximately 140 million full-time knowledge workers worldwide. While technological progress throughout economic history has largely been confined to the mechanisation of manual tasks, requiring physical labour, technological progress in the twenty-first century can be expected to contribute to a wide range of cognitive tasks, which, until now, have largely remained a human domain. The trend is clear: computers increasingly challenge human labour in a wide range of cognitive tasks (2013 np).

Beyond automation there are other key trends such as:

> 1. job/market polarisation (middle skill jobs are declining but both low-skill and high-skill jobs are expanding; there is bifurcation into highly paid, skilled workers and low-paid, unskilled workers);
>
> 2. relocation of labour supply (from middle-income manufacturing to low-income service occupations) and,
>
> 3. rise of flexible and freelance work (furthered by the development of new structures within peer-to-peer economy).

The future of jobs is anticipated to become more and more about "the survival of the most adaptable". Workers of the future will be expected to have "portfolio careers" and often negotiate several roles at the time. Casualisation of labour will even further undermine "one job", "job for life" or even "one career" narratives that we have inherited. For many workers this is already a current reality – the forecast is that "full-time" employment in one area of work is going to be even more significantly undermined, if not gone altogether. This, of course, means that 'work' as a category of identity and purpose will need to be rethought.

So what are job seekers to do? And, are there any good news on the horizon?

Short of lobbying for the 'universal basic income' (which may also come in due course), it is important to remember that in the past technology has always ended up creating more jobs than it destroyed. And, the experts are not at all clear on this, as MIT Review columnist Erin Winick points out

> …no one agrees. Predictions range from optimistic to devastating, differing by tens of millions of jobs even when comparing similar time frames (2018 np).

For example, only a short while ago jobs such as 'video-game designers' or 'cybersecurity specialists' did not exist. Moreover,

> …automating a particular task, so that it can be done more quickly or cheaply, increases the demand for human workers to do the other tasks around it that have not been automated (Morgenstein 2016).

And so, rather than overly focusing on keeping outdated jobs, perhaps it is helpful to remember that destroyed jobs are often redefined and new ones continuously created.

Second, and more importantly, it is important to start thinking beyond the jobs. Income and work creation, and perhaps also 'satisfied customers', whoever these customers are, need to become new guiding narratives. Already, there are endless lists of new skill-sets and capabilities that will be highly sought after in the future. New learning platforms, for example, offer many insights into the jobs and income streams of the future (check under 'popular courses', 'courses in demand' etc.). There are also numerous future-job maps out there for those still wishing and willing to hold onto the concept of stable work. One just needs to start looking. For that, of course, excellent or

at the very least improved research skills are required. And so, we close with that one hint – those wishing to find more about where the income, jobs and work will come from in the future may want to start with doing futures research first!

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‘Outside the dome’

Shelley Davidow

Outside the Dome, tufts of grass bent in a late-afternoon breeze that rippled over the shifting sands. The sun broke through haze and reflected off the quartz in the desert.

Harold shifted in his pod-seat, flicked through the five screens in front of him and clicked on the movement break + nutrition + Ritalin button on his computer keyboard. He put in his micro-earphones. Disco-beat music resounded in his head. Pod 123 closed over his head to ensure no noise escaped to the other pods. No other person could be seen, though thousands sat in identical pods carefully screened off from one another. The hourly announcement blasted his eardrum.

This is the Senior Systems Manager to remind you all how lucky you are to live in this great century, under the arch of the Great Dome, where we live in peace and harmony, where all humans have work regardless of age, race or gender, and where your self-appointed government will take care of you and can be trusted to ensure your ongoing survival on the planet. As the saying goes: ‘We are One!’ Have a great day.

The chair began to vibrate – leather pads closed around his ankles, his thighs, his neck. The footrest shifted, the wheel beneath his feet on the chaircycle spun, and his legs moved furiously. Sixty calories burned, seventy, ninety…

The year was 2222 and all the world’s problems had finally been solved.

The remainder of humanity lived inside the walls of the five hundred acre Dome.

A message on screen 4 from the Director of Eduhub: Socializing and exercise time: 15 minutes. Time until next log-in: 14 minutes 25 seconds.

Harold’s legs pedaled like crazy. A cool fan came on above and the sweat on his forehead evaporated. One hundred calories burned.

Exercise complete.

A Superbar dropped from the machine above the screens and he reached out, unwrapped the plain white casing and ate it, hardly tasting it. He felt anxiety and boredom coming on and held out his left arm. For the past few weeks the tube had been annoying him. An inflammation again, perhaps. He pressed the button and Ritalin flowed into him. Relief.

Screen 5 blinked

You have a new message from Pod 67:

67: Hey Harry…

H: Who’s this?

67: Wanna play Great Escape?

H: Never heard of it. Who are you? How do you know my name?

67: Medical Systems Administrator with side-job as game-designer. Made a new game. Meet in the corridor post-school?

H: What for? Still got two hours of work after study to earn Daily Points. How do you know me?

67: I monitor your Ritalin intake. You’re maxing out.

H: I can't sit still for long periods of time anymore. Going crazy.

67: What? You're bored studying the History of Systems Management through the Ages? Don't you enjoy your job as Food-Intake-Data-Collector?

I'M SORRY, BUT YOUR CONVERSATION HAS BEEN INTERRUPTED. PLEASE TALK TO SOMEONE ELSE.

Pod 25: Hi, sexy, how are you?

H: Signing out. Sorry.

He closed his eyes, took out his micro-earphones. He'd never met most of his friends face-to-face, but they shared photos music and movies and played virtual games. Probably now he'd be under 'observation.' He didn't understand why some conversations were ended as 'controversial' when they seemed so banal. He felt a headache coming on. One of his only friends, Matt, had been permanently removed last week from his account, by the Administrator General. The message came just after Matt had asked: ever wonder what it's like outside? Harold had no way of finding out if his friend still lived. Sometimes, he knew, people vanished forever. Death under the Dome was clean and peaceful for everyone. Nothing more than a shot in the arm, and if you were lucky, at a time of your choosing. After a certain age, or when the System detected too much deterioration, it was expected that you'd volunteer, choose your Endtime, to make room for the younger, healthier generation.

Harold logged back in and completed Module 10 (How We became a Systems-Run Society) and Module 11 (Endgame: Nuclear War of 2022), and did wonder again, but only briefly, about what it might have been like living outside back then before the Nuclear Decimation, when people actually breathed air, felt the sun on their skins…but then his thoughts caused hints of emotional pain, leading to memories of his parents, at which point, he reached for his pack of candy-coated Mind-Numb-Balls-Type-A (which did not interact with the Ritalin) and crunched two of them quickly. His emotions stabilized.

His parents, weary with life, had made the Endcall a year ago when their only son turned eighteen.

Because of this, he'd inherited all their Daily Points, which meant he would survive. Right after their deaths, he'd made an urgent request for medication. MedHub sent no response. He knew his body hadn't shown enough signs of distress yet. He should have asked the Medical Systems Administrator while he had him online, he thought. Maybe it was just time for a holiday. That was it. He'd book in a virtual vacation for next week during study break. Probably just needed a change of scenery. Anyway, he had enough Daily Points for a life-time of virtual holidays and now was probably the time to cash one in.

He feared Matt had been invited to donate his life to avoid it being taken from him, for threatening the Establishment. This happened all too often. If he donated, he got to give all his Daily Points to a person of his choosing and since Harold was one of his only real friends and hadn't heard anything, he hoped Matt still lived.

Outside, the light shifted to afternoon. In the distance, wind stirred a dust-devil and it danced over the land, smashing and dissipating into the western side of the Dome wall and leaving a fine coat of gold on the impenetrable glass.

Book a Vacation

Where would you like to go? Your virtual destination is limited only by your imagination: choose the beach, the snow, even Mars…

Incoming message: System Error – program interrupted.

67: Quick, Harold. Get off your arse. The corridor ASAP.

Harold, moved by an echo of an emotion he barely recognized, logged out as if in a trance. Numbed by the candy that still stuck to his teeth, he released himself from the chair, the two sticky sensors on his neck that fed back all his physical details on a second-by-second basis to the Head of Medical Systems and then, painful though it was, extracted the 'volunteer' tracking device that lay half embedded in a small incision on the back of his calf which he had only signed up for because of the extra daily points he accrued.

Free for a moment of all systems, he felt dizzy. He left his pod, and made his way into the windowless white corridor, which led to the docking station for the train home. The corridor offered the only opportunity for meeting other systems administrators – though only a handful at a time. And 3pm was too early for most, anyway.

'Behind you,' said a voice.

Harold turned. He hadn't heard any noise! An old man with skin like a desert landscape and bright blue eyes held out his hand. 'I'm 67. I thought you wouldn't do it. Good to meet you Harold. I've been tracking you a while.'

'Pleased to meet you, 67. You're the Medical Systems Administrator?'

'Sure am. You've eaten too many goddamned Mind-Numbers. Now. There's no time to lose. You have thirty seconds to make a life-changing decision: you can carry on as you are, a moron, a joyless, worthless administrator of a part of a machine going nowhere until you die, or you could take a risk. Come with me. If you say no, go home to your mini-Dome and farewell. If you say yes, you'll never see the inside of the only reality you've ever known, ever again.'

'Hmm,' said Harold.

'Twelve seconds left.'

'I can't think that fast.'

'Ten, nine, alright, I'm leaving. Have a good life.'

67 pushed past him. Harold grabbed onto his tan coat. 'Don't go without me,' he said.

They raced down the corridor, past sliding doors that led to numerous docking stations, and bumping into a few individuals waiting for the doors to open, wearing headphones and staring at their devices, not paying attention to the two hasty figures.

'Left,' 67 said, and pushed Harold through a fire-escape door.

Harold's head pounded. He had left his phone, his backpack and computer, his sensors and snacks and painkillers and everything essential in his pod.

'67, please, I need to stop for a second.'

'Harold, my name's Anthony. Aged Anthony if you will. I'm the hell in with numbers.'

'You can tell me where we're going, Anthony.'

‘I will. I have managed to put all your, and the others’ Vital Signs Data on auto repeat for five hours. That should give us enough time to get out before my colleagues notice we’re gone. We haven’t had an escape for decades.’

‘The others?’

‘Yep. Come on, down these stairs and I’ll tell you. I have secured a friend of yours, and a co-worker, 25 and 26, who are waiting. I’ve been building an escape route for a long time and finally it’s all set up. A life on the outside. For the first time in more than a hundred years.’

‘But won’t we die in three days from radiation poisoning?’

‘I question that,’ he said.

At the bottom of the stairs, a double-door, sealed, immovable. Aged Anthony held his wrist to a glowing blue light and Harold heard a click.

‘Administrator privileges,’ Anthony said, and grinned. ‘Thought I’d never use ‘em. My insert undoes the locking codes. Meant, of course, only for disasters. But, haha, we are a disaster.’

Harold watched as the massive doors opened and allowed them into an interim zone. More doors in front. Anthony held his wrist up to a red light. The doors behind them shut. The doors in front began to swing open.

‘Ten seconds to freedom,’ he said. Harold felt naked and lost. No devices. No time, a headache coming on.

The smell hit him first. What was it? Decay? Air? Things that grew. Then the heat – the light.

He closed his eyes. Doors shut behind him. Gravel under his feet.

‘Shit,’ he said. ‘I would have done this years ago, if I could have.’

‘Look around,’ Anthony said. ‘This is what’s left of the planet. I’ve been keeping myself alive for the past one hundred and fifty years, and I think the human race can do a damn sight better than just sitting around in their bubble – goddamn cold-hearted Administrator General overseeing what I once believed were valuable lives. Look!’

Beyond the Dome and the rubble – a ruin of a house being eaten by sand.

‘Used to be a suburb,’ Anthony said. ‘You have no search engine to find out what suburbs looked like a hundred and fifty years ago, so I’ll tell you: single homes, not connected. Each one with doors, windows, free access to the outside. Streets connecting these houses. People moving around.’

‘Wasn’t there theft? Murder?’

‘Yes, as the books say, of course, sometimes theft. Sometimes murder. Not often.’

‘But no Controller, deciding when you had reached your Endtime?’

‘No.’

‘What about food?’

‘Shops – everywhere. Some of them run by individuals not corporations. And money – a currency. Coins not points. Heavy in your pocket. Some people with too much of it, others with not enough. An imperfect world, to say the least.’

Harold's eyes could barely let in such brightness. What was it that he saw beyond the ochre walls of the house, sand inside up to window level.

'Is that a forest?'

'Ah yes. One of the last. Gives me some hope. Pine trees growing, renewing, despite the bombs of the last war.'

'I thought Uranium 235 had a half-life of 700 million years. How long are we going to survive out here?'

'No idea,' Anthony said. 'Who cares? I have, in this backpack – two centuries old but kept in great condition – seeds.'

'Actual seeds? To plant in the ground?'

'Yes. Cucumbers, pumpkins, even chickpeas. Fertilizer until we get compost. We're going to try the ground.'

'What's compost?'

'Tell you later. Come on, walk this way. How does that air feel in your lungs?'

Harold walked behind, then ran after the old man. His lungs didn't feel good, but then, they'd never had to work so hard.

Behind the house and as far as the eye could see, sand, barrenness, cracked earth, and beyond that, harsh sky.

And then, to Harold's surprise, three figures emerged from the skeleton of a house.

'Matt?'

'Hey Harry!'

'I thought you were dead!'

'Haha. Not yet. And here. Meet Max and Maxine Clamper!'

Blonde twins emerged. Sweet faces, nice smiles. About the same age. Harold shook their hands. Their white clothes brown with dirt.

'All of us were sort of in the same boat,' Maxine said. 'Welcome, Harry. You maybe didn't know, but Anthony did. You were on the list. You were being observed. Like us. Starting to get disruptive thoughts. They were onto you. And you would've been asked to end it sooner or later.'

Harold felt sick. But then he looked up. Saw the wide sky.

'Luckily,' Matt said, 'our Medical Systems Administrator here has been waiting for just the right people and opportunity. Come and see the house. We've rigged the water-extractor so should have enough to drink as long as there are a few clouds in the sky. Some of the roof still exists and we're staying under it.'

The first day post-exit Harold could barely stand. He'd slept on a mound of earth all night and seen the stars overhead through the open window. He'd been cold. An unpleasant feeling. He woke to the sound of the others collecting broken bricks. They built five garden beds in the front of the house and planted them with seeds.

Harold looked at the desert. Nothing will grow here, he thought. He imagined he might succumb to radiation sickness. But the sun warmed his alabaster skin and he turned his face to the air that came from the trees. He tried to get up and felt like he was falling.

He needed his phone. His painkillers, he needed to check his messages. He needed Ritalin and he felt agitated and lost and imagined it might have been better to have stayed behind. He wasn't earning. He floundered and Maxine walked by, caught him as he fell.

No systems. No clocks. Just the sun, still good to run for around five billion years.

Growing food in such damaged earth was challenging. Cucumbers seemed to fare the best. Harold developed an affinity for them. The ones he planted blossomed earliest. He worked as he had never known he could work, and his body reshaped itself as if it had been made for this. He ached. His skin turned the colour of rust. He slept without aids from sunset to sunrise. This work was like nothing he had imagined. It integrated all his senses. Joy pulsed through his being even as his muscles hurt. His brain cleared. He no longer feared the future. The moment was all he had, and he lived it through his senses. The Superbars the twins had amassed and brought lasted some time and then ran out. Everyone grew thin. No rain fell. The group told stories around a fire in the evenings to distract from hunger. Matt and Max invented games.

Maxine and Harold fell in love.

The stars above at night were the most magnificent things Harold had ever seen. His ache for food diminished. He held another human being close and breathed in the smell of her hair.

Still no rain and the seeds grew slowly. Some withered. The sunlight shone through an atmosphere no longer conducive to optimum biological or ecological functioning of any kind.

Over the next weeks Anthony sickened. He lay in the ruined house and called his friends to him. 'I've set up a chain of messages, hacked the whole administration of the Dome, and infiltrated every operating system. Over the years, expect that many people, alone or in a group, will find their way out. And those who come, will be the right ones.'

A week later, he died in the night. The next day, Harold carried the shrunken body of their friend to the edge of the forest. The others helped him dig into the earth. They found, beneath the layers of pine, damp, dark soil.

And then, as they turned to look at the house, an unfamiliar sound. The sky to the west grew dark. A shadow crossed the sun and they looked up into indigo clouds. Thunder rumbled. The air crackled with ozone. It was possibly still too late for them, but that was not the point. There would be others. The story would go on with or without them. Matt and Max and Harold and Maxine lifted their noses to the wind and breathed in the smell of rain not yet fallen.