a field guide to the future of work

COLLECTED ESSAYS

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Foreword

Algorithms that can detect cancers as accurately as trained pathologists. Personal AI assistants that can mimic human voices to make bookings on behalf of their users. Machines that can lay bricks at a rate six times faster than human labourers.

The number of technological accomplishments grows by the day. But what do these developments mean for workers?

Pick up any newspaper or watch any news item on the subject and you are likely to be presented with one of two opinions. Either that we are on the cusp of catastrophic job losses and economic misery for the masses. Or that these new technologies will supercharge productivity, leading to a rise in living standards and an abundance of good quality jobs. High profile cheerleaders on each side of the debate eagerly point to statistical analyses which back their vision of the future.

The tussle between these two sides has proven a fascinating spectacle for the lay observer – certainly enough to warrant regular media headlines. But to the RSA, which has been exploring the impact of technology on jobs for some time, the quality of public debate leaves much to be desired. At least four major shortcomings can be identified:

The first is that commentators tend to fixate on just a handful of technologies – namely artificial intelligence and robotics – while paying little attention to the less glamorous but still powerful innovations like e-commerce platforms, the internet of things, distributed ledgers, cloud computing and smartphones.

The second is the relentless focus on automation, as though this was the only way technology can shape the lives of workers. Machines are also changing recruitment practices, facilitating surveillance and monitoring, altering the nature of business models and restructuring industries (with new technology often aiding market concentration).

The third is that analyses of the effects of technology too often dwell on what is theoretically possible while ignoring what is actually happening. We hear of breakthroughs in individual technologies like autonomous vehicles and personal voice assistants. But seldom do we learn whether these same innovations are adopted in the real world.

And fourth, we pay too little attention to the systemic effects of technology, such as how its adoption in one corner of the economy can affect the lives of workers in different sectors. An example is the phenomena of 'recycled demand', whereby the deployment of technology in one industry leads to cost savings for consumers, which frees up cash to spur demand (and potentially job growth) in another part of the economy.

These shortcomings cannot go unaddressed. The quality of the conversation about technology matters greatly to our ability to prepare it. The civil servant in the Treasury dictating tax policy, the FE college leader rethinking their skills curricula, the corporate HR chief reconsidering their employee welfare programme – all are susceptible to making bad decisions with bad intelligence.

Which brings us to the purpose of this essay series: to break out of the same overworn questions, and give more airtime to alternative and thoughtful perspectives on how technology might shape the world of work.

A common theme in this series is the shifting sands of power. Nicolas Colin argues that the emergence of the digital economy has put consumers at the top of the food chain, and it is they who are now squeezing concessions out of workers rather than employers.

Other contributors turn to the familiar theme of automation, but with a fresh perspective. Calum Chace argues that automation will be a relentless job killer, but that it could also drastically reduce the cost of living for those on low incomes. Nick Srnicek similarly sees the brighter side of a new machine age, believing that it could usher in a 4-day working week. Astra Taylor, meanwhile, writes that automation is mostly a charade – a ploy by firms to look sophisticated while humans continue to do grunt work behind the scenes.

Several contributors predict that work will be bountiful in the years to come. But they also warn that such work will be highly scrutinised. Phoebe Moore contemplates a bleak future where workers find themselves at the tyranny of a pervasive surveillance system – one where monitoring tools not just assess worker performance but watch every aspect of their movement. Azeem Azhar echoes these warnings, suggesting that it may not be long before most of us have a rating attached to our name, which will determine eligibility for different job platforms and even goods and services like housing.

We are reminded, too, that the UK is not alone in feeling the effects of technology. Mark Graham writes about the emergence of a planetary labour market, where new technologies have allowed more jobs to be outsourced from developed to developing economies – including the grisly work of content moderation. Urvashi Aneja, our final contributor, ponders what a new machine age will mean for India's 1.3 billion citizens. Will it fast track social mobility, or rather exacerbate the informal economy and lock in existing class and caste divides?

Some may feel the additional perspectives of these writers complicate rather than clarify the impact of technology on work. But that is precisely the point. Too often we yearn for neat forecasts that aim to tell us exactly how the future will play out ('X million jobs to go by 2040'). In fact, we should be contemplating and preparing for multiple eventualities. The humility this requires may not come easily to those used to making confident predictions, but it is the only sensible way of readying ourselves for the future.

Our aim with this collection is to offer an eclectic, expansive, thought-provoking, though by no means exhaustive picture of the future of work. We hope readers will enjoy the plurality of perspectives presented, and we would encourage you to take a moment to think about how they might inform practices in your own workplace, profession or industry. Far from being a manifesto for fatalism, this pamphlet should rather be read as a call to action. After all, the point is not simply to sit passively and wait for the future to hit us, but to actively shape it in the way we see fit.

A workforce in flux

While this essay series contemplates the future of the UK's labour market, it is also worth reflecting on how it has changed in the recent past. Fresh analysis of the Labour Force Survey reveals a workforce in flux, rocked by a combination of technological developments, austerity and changing consumer tastes. There is strong growth in both hi-tech and hi-touch jobs – the former being roles that involve the creation or maintenance of technology, and the latter being occupations that emphasise caring and nurturing.

3.1 million jobs have been added to our economy since 2011, leaving unemployment at a 45 year low

Among the top 20 fastest growing occupations are:

- **Programmers and software developers** (up by 60 percent or 136,000)
- **Human resource managers and directors** (68 percent or 82,000)
- **Care workers and home carers** (10 percent or 71,000)
- **Elementary storage occupations including warehouse workers** (19 percent or 76,000)

Among the top 20 fastest shrinking occupations are:

- **Retail cashiers and checkout operators** (down by 25 percent or 59,000)
- **Bank and post office clerks** (26 percent or 39,000)
- **Telephone salespersons** (45 percent or 24,000)
- **Administrative occupations in central government** (35 percent or 89,000)

Women are significantly underrepresented in many fast growing hi-tech occupations. They make up only 6 percent of new programmers and software developers and just 9 percent of IT and telecommunication directors.

Women may have borne the brunt of austerity measures in the public sector. They account for 112 percent of the job losses in teaching assistants, 81 percent in social service managers and directors, and 74 percent in administrative occupations in central government.*

* Where figures are higher than 100 percent, it means that job losses among women amount to more than the net job losses for that occupation, with job gains in men making up the difference. For example, female teaching assistants fell by 52,000 between 2011–18, whereas male teaching assistants grew by 5,000, equating to a net job decline of 47,000.

Robots will steal our jobs. Hooray?

CALUM CHACE

Forecasting is hard, especially about the future. The one thing we know about all forecasts (except for trivial ones) is that they are wrong. But that does not let us off the hook. We cannot ignore the future, since all of us – well, most of us, anyway – plan to live there. We must use experience, judgement, and yes, history, to try to discern the outlines of what is coming, and how best to cope with it.

The big questions I want to address here are:

– Will robots steal our jobs?

– If so, will we invent enough new ones?

– If not, how can we cope?

The first question is easy enough to answer. Of course robots will steal our jobs: machines have been doing that for ages – since before the start of the industrial revolution. It's called automation, and the poster child is agriculture. In 1800, 80% of all Americans who worked did so on farms. By 1900 the percentage was down to 40%, and now it's around 1%. The grandchildren of those farm labourers are not all unemployed, though: they work in offices and shops, warehouses and factories.

Automation is a shape-shifter, and soon it will start to steal the jobs of drivers. Google's self-driving car spinoff company Waymo began piloting a fully automated taxi service in Phoenix in April 2018. On occasion (they won't say how often), there is no-one in the front seat – no driver, no engineer, no chaperone. In December it converted that programme into a commercial service.

GM has a self-driving vehicle division called Cruise which has long said it will launch a fully automated taxi service in 2019.

It may be some years before self-driving cars (or Autos, as I hope we will call them) are affordable to consumers, and some years after that before humans are banned from driving on public roads because they are too dangerous (although that will come). But commercial fleets will switch over quickly because economics will force them to: if they don't, rivals which do will undercut them. The number of people employed to drive taxis, vans, buses and trucks is five million in the US and one million in the UK.

Other jobs which will fairly soon go the way of gas lighters and lift operators are call centre operatives. (If you haven't seen or heard the demo of Google Duplex, Google it now: it's astounding. We'll wait here until you come back.) And "Go", Amazon's pilot cashier-less supermarkets are tolling the warning bell for America's 3.5 million cashiers.

So the first hard question is not whether machines will take our jobs, but whether we will replace them all with new jobs. This is, of course, what has happened in the past – otherwise we would all be unemployed already, whereas in fact we are pretty close to full employment, at least in the US and the UK. This has come as a surprise to some: technological unemployment is a spectre that has been raised numerous times since the early 1800s, when the Luddites were viciously suppressed by the British government for smashing the looms which threatened their livelihoods.

Because automation has not caused lasting widespread unemployment in the past, some people (including quite a few economists) have concluded that it cannot do so in the future. They call the idea that it can the Luddite Fallacy. But their argument is facile. Past performance is no guarantee of future outcome – even a stockbroker can tell you that. If it was, we would not be able to fly. And in fact, automation has already caused massive unemployment – of horses. In 1915 there were 21.5 million horses in America, pulling carriages and agricultural machinery. Today the equine population of America is two million. That is rather severe technological unemployment.

Past rounds of automation have mostly been mechanisation: the replacement of muscle power by machines. Once machines took the muscle jobs, the horse had nothing else to offer, which is why 1915 was "peak horse". Humans were more fortunate: instead of pulling, pushing and lifting, we now use our cognitive abilities in offices and shops.

But now a new and different type of automation is on the way: cognitive automation. If machines take our cognitive jobs, what will we humans offer next? Can we trade on the fact that we are conscious and the machines are not? Unconscious beings cannot have true empathy, so perhaps we can all be each other's nurses and therapists. Or perhaps there will be some other, unexpected ways in which we can sell our consciousness to each other: inventing ever more intricate landscapes for virtual reality entertainments, perhaps.

But I'm running ahead of myself. You might object, not unreasonably, that machines are far from being able to replace our cognitive abilities in most jobs. This is true, but machines have come a long way, and they are only at the beginning of their story. The smartphone in your pocket has more computing power than NASA had at its disposal when it sent Neil Armstrong to the moon. In fact, a top-end toaster now has more compute power than NASA had – which just goes to show what a brave man Neil Armstrong was.

Computers are getting twice as powerful every 18 months, and have been doing so for decades. The name for this exponential process is Moore's law, and contrary to what some people say, Moore's Law is not dead: there is a lot more Moore to come. It is no longer driven by faster clock speeds, but the cramming closer together of tiny components has some distance to go yet. And for the geeky among us, the shift from Central Processing Units (CPUs) to Graphics Processing Units (GPUs) has enabled great leaps in the application of machine learning. The shift to Tensor Processing Units (TPUs) is now doing the same: these operate at very high speeds with lower precision than GPUs and CPUs, and are specifically designed for machine learning applications. Beyond that lies neuromorphic computing. IBM has a neuromorphic chip called TrueNorth, with around a million silicon "neurons", each with 256 "synapses".

Exponential growth is not stopping any time soon. And it is incredibly powerful – a fact which we all know, we all forget, and we all need frequently reminding of. So here is a reminder.

Imagine you're in Wembley stadium, and it has been made waterproof. The referee drops one drop of water onto the pitch. A minute later, he follows this with two drops. A minute later, four drops. Another minute later, eight drops. And so on. How long do you think it would take to fill the stadium, and drown everyone in it? The answer is 49 minutes. But the really surprising and frightening thing is that after 45 minutes the pitch is just damp. Four minutes later, you and everyone else in the stadium has drowned.

Exponential growth is very powerful, and because each step in an exponential process is equal to the sum of all the previous steps, it always looks like you are the beginning, no matter how long it has been going on. In ten years, the machines we have will be 128 times more powerful than the ones we have today. In 20 years they will be 8,000 times more powerful. And in 30 years, they will be a million times more powerful. They will probably not be general intelligences by that point, or on the cusp of being superintelligent. Most people will agree that they will not be moral agents, either: that requires some agency, which they will still lack along with consciousness. But to blithely declare, as so many people do today, that machines in 30 years will not be capable of doing any job that a human can do for money is not only complacent: it is irresponsible and dangerous.

Does this mean we are sleepwalking towards disaster? Not necessarily. Automation drastically reduces the cost of providing a good or a service. Another thing which does this is cheap energy, and the cost of solar power, storage and distribution is falling exponentially. It is entirely possible that within a generation, large parts of the economy will be significantly demonetised. The music industry shows what this can mean. When I was young it was impossible for even a rich person to listen to all the music they might want to. Now it costs £10 a month. The same could be true, for instance, of taxi journeys: remove the human driver and make the car run on nearly-free electricity, and you could subscribe to unlimited journeys for a tiny fee.

If the economy is largely demonetised, then it becomes feasible to make everyone rich, in the sense of having access to all the goods and services that you need for a very good standard of living. If technological unemployment forces us to separate income from jobs, there will have to be a transfer of resources from those who are rich, and those who are still earning. This is probably only achievable if the economy is demonetised.

We do not know for sure that this is likely, or even possible. But given the fact that technological unemployment is a distinct possibility in the 20-30 year timeframe, we should certainly be thinking seriously about it now. Not least because the anticipation of it will come much sooner, and could cause panic, and severe social dislocation.

And what about the meantime – the next 15 to 20 years? What will the workforce of 2035 look like? If we're honest, we don't know whether students today should study STEM subjects because tomorrow belongs to the machines, or the humanities, because humans will need to differentiate themselves from machines. My hunch is that students should study the thing that interests them most.

The one thing we can be confident of is that there will be a lot more job churn in the coming years than we have been used to. The baby boomers were the last generation in which many members stayed in one job for a whole career. Coming generations may need to re-train every decade, then every five years, then perhaps every year. We are going to have to get much better at re-training and re-skilling, and continuous education will have to become a real thing. Fortunately, the education industry is going to be transformed by artificial intelligence. Almost no educationalists or policy makers have the slightest idea of what is coming in this regard, and it will happen despite them, not because of them. But that is another story.

The faux-bot revolution

ASTRA TAYLOR

Somewhere, right now, a manager is intoning to a broke, exhausted underling that someone is willing to do the same job for less – or, that some thing is willing to do it for free.

Robots lend the centuries-old dynamic of owners and bosses telling workers they are replaceable a troubling new twist: employers threaten employees with the specter of machine competition, shirking responsibility for their avaricious disposition through opportunistic appeals to tech determinism. A "jobless future" is inevitable, we are told. (Sadly, the jobless future for the masses doesn't resemble the jobless present of the 1 percent who live off dividends, interest, and rent, lifting nary a finger as their bank balances grow.)

Though automation is presented as a neutral process, one needn't look that closely to see that this is hardly the case. Automation is both a reality and an ideology, and thus also a weapon wielded against poor and working people who have the audacity to demand better treatment, or just the right to subsist.

But if you look even closer, things get stranger still. Automated processes are often far less impressive than the puffery and propaganda surrounding them imply – and sometimes they are nowhere to be seen. Jobs may be eliminated, salaries slashed, and production lines sped up but people are often still laboring alongside or behind the machines. As one low-wage worker who toils in a Chinese "digital factory" tagging images to train AI recently told the *New York Times,* "I used to think the machines are geniuses. Now I know we're the reason for their genius."

These days machines are used to deskill, speed up, or displace work (meaning it simply gets shifted to other people, typically customers), but work rarely disappears. To grace these moves with the somber moniker of "automation" exponentially oversells the emerging workplace dynamic. Hence, I propose making our idea of automation itself obsolescent. A new term, "fauxtomation," seems far more fitting.

Fauxtomation is purposely hard to discern, since by definition it aims to disguise the real character of the labor in question. Consider the fact that more people work in the shadow mines of content moderation (ceaselessly staring at beheadings, scenes of rape and animal torture, and other scarring images in order to filter what appears in our social media feeds) than are officially employed by Facebook or Google.

And many, though not all, of the people employed as content moderators live abroad, in places like the Philippines or India, where wages are comparatively low. As with all labor relations, race, gender, and geography play a role, determining which workers receive fair compensation for their labor or are even deemed real workers worthy of a wage at all. Automation, whether real or fake, hasn't undone these disturbing dynamics, and may well intensify them.

Overselling automation

Fauxtomation manifests every time we surf social media, check out and bag our own groceries, order a meal through an online delivery service, or use a supposedly virtual assistant that is (surprise) in fact powered by human beings. Yet even though we encounter this phenomenon everyday, we often fail to see – and to value – the human labor lurking behind the high-tech facade (even if it's our own). We mistake fauxtomation for the real thing, reinforcing the illusion that machines are smarter than they really are.

That's just how the powerful want it to be. In 2013 exploited and underpaid fast-food workers went on strike across the country, agitating for little more than a livable wage as part of the Fight for 15 movement. In response, elites shamelessly deployed the myth of human obsolescence. The Employment Policies Institute, a conservative think tank, took out a full-page ad in the Wall Street Journal:

Today's union-organized protests against fast food restaurants aren't a battle against management – they're a battle against technology. Faced with a $15 wage mandate, restaurants have to reduce the cost of service in order to

maintain the low prices customers demand. That means fewer entry-level jobs and more automated alternatives – even in the kitchen.

Former McDonald's CEO Ed Rensi got plenty of press attention a few years later with similar comments. "It's not just going to be in the fast food business," Rensi said. "If you can't get people a reasonable wage, you're going to get machines to do the work… And the more you push this it'll just happen faster."

Soon after making these remarks, Rensi provided gloating commentary for Forbes. com that his warnings about automation had already proven true. "Thanks To 'Fight For $15' Minimum Wage, McDonald's Unveils Job-Replacing Self-Service Kiosks Nationwide," boasted the headline. Rensi could barely contain his glee – though he did gamely try to shed a few crocodile tears for the burger behemoth's now-redundant corps of line workers. "Earlier this month, McDonald's announced the nationwide roll-out of touchscreen self-service kiosks," Rensi wrote. "In a video the company released to showcase the new customer experience, it's striking to see employees who once would have managed a cash register now reduced to monitoring a customer's choices at an iPad-style kiosk."

In reality, what is actually striking when you watch that video is just how un-automated the scene is. Work has not disappeared from the restaurant floor, but the person doing the work has changed. Instead of an employee inputting orders dictated by the customer, customers now do it themselves for free. Fauxtomation strikes again.

More work for everyone

In its more harmless form, fauxtomation is merely a marketing ploy, a way to make pointless products seem cutting-edge. (The Tovala "smart oven," for example, is but a glorified Wi-Fi-connected barcode-scanning toaster.)

But while the gap between advertising copy and reality can be risible, fauxtomation also has a more nefarious purpose. It reinforces the perception that work has no value if it is unpaid and acclimates us to the idea that one day we won't be needed.

The Italian theorist Silvia Federici has tenaciously analyzed the ways in which feminized, domestic work – what she calls reproductive labor – is essential to capitalism even as capitalists and bosses refuse to acknowledge its productive existence. Beginning with her activism with the group Wages For Housework in the 1970s, Federici has argued that we must recognize the underappreciated,

uncompensated labor that sustains everyday life, providing the foundation that underpins all manner of paid work recognized by the formal economy. Every bridge, every factory, every Silicon Valley app is merely the visible tip of a hidden iceberg of reproductive labor.

It's an insight that may seem obvious, but is actually revelatory. At the University of Toronto in 2017, I watched as Federici fielded an earnest question from a graduate student who said something about how automation would expand the reserve army of labor – Karl Marx's term for the multitude of workers without access to steady employment. The graduate student took for granted that, soon enough, there would not be enough work to go around and that many people would become surplus, expendable, and effectively irrelevant to society. Many in the audience nodded their heads in agreement – including me.

Federici's response was bracing. She vehemently denied the premise of the question – that we must acquiesce to the idea that, come the great automated apocalypse, masses of people would have no productive work to do: "Don't let them make you think that you are disposable," she passionately proclaimed. At that moment, I realized the depth of Federici's insight. Her point is not that women have, historically, performed reproductive labor outside the sphere of waged work, that their efforts are supplemental to the real action. Rather, she insists that reproductive labor is utterly central: in its absence, the entire system would collapse.

As socialist feminism usefully highlights, capitalism is dedicated to ensuring that as much vital labor as possible goes unseen and uncompensated. Fauxtomation must be seen as part of that essential and longstanding tendency.

Machine dreams

There is no denying that technological possibilities that could hardly be imagined a generation ago now exist, and that artificial intelligence and advances in machine learning and vision put a whole new range of jobs at risk. The problem is that the emphasis on technological factors alone casts an air of blameless inevitability over something that has deep roots in class conflict. The phrase "robots are taking our jobs" gives technology agency it doesn't (yet?) possess, whereas "capitalists are making targeted investments in robots designed to weaken and replace human workers so they can get even richer" is less catchy but more accurate.

We have to recognize both the dangers and possibilities associated with automation while relentlessly poking holes in rhetoric that seeks to conflate

technology's present and potential capacities with an inescapable, and deeply exploitative, way of organizing labor and compensation. Where fauxtomation attempts to pass as automation, we should call it out as such.

Instead of capitulating to the owning class's loose talk of automation as a preordained next phase of production, we should counter with demands that are both visionary and feasible: a federal job guarantee that provides meaningful work to all who want it or job sharing through a significant reduction in the workweek. When pundits predict mass unemployment following a robot takeover, we should call for collective ownership of the robots and generous social benefits detached from employment status, including pushing for a progressive variation of a universal basic income under a rallying cry that updates the 1970s socialist feminist slogan to Wages for All Work – not just the work that bosses recognize as worthy of a meager paycheck. Only once these sorts of transformations are in place can automation help create conditions of prosperity, leisure, and meaningful labor for everyone, not just the owning class.

There will be lots of work to do in 2035, of that I am sure. The question is whether the labor being done will be recognized as such, whether it will be dignified or deskilled, rushed or performed at a reasonable pace, un- or underpaid or fairly remunerated, meaningful or alienated. These are all political questions, not technological ones. If the automated day of judgment were actually nigh, they wouldn't need to invent all these apps to fake it.

Note: This text is adapted from the original by Astra Taylor that appeared in Logic Magazine.

The fight for free time

NICK SRNICEK

Everywhere we turn today, we are told that our traditional world of work is threatened by robots and automation. But what if this gets the story backwards? What if, rather than a threat, we saw these robots as an opportunity to liberate society from the drudgery of work and to free ourselves to create our own projects? This is the wager of a growing number of people around the world.

This movement points to a basic fact of wage labour: our time is not our own. Instead, our time at work is dictated by a manager, a boss, an employer, and ultimately, by capital. It is for this reason that Karl Marx once wrote, "the realm of freedom actually begins only where labour which is determined by necessity and mundane considerations ceases; thus in the very nature of things it lies beyond the sphere of actual material production."[1] Free time, in other words, is the basic condition for freedom. Building on these ideas, the movement against work also argues that more free time presents a tidy solution to the potential problems of rapid automation. If robots can do the work, why not let workers have more free time?

Until recently, the idea of fighting for more free time was not on the UK's political radar. After the labour movement's early successes in the struggle for an 8 hour day and a 40 hour work week (May Day, for example, has its origins in the fight for a shorter day), the postwar period settled into a focus on improving wages rather than increasing free time. This is beginning to change, particularly as technology looks to rapidly restructure the labour market (with or without net job losses). Across intellectual networks, political parties, trade unions, and businesses, there is a resurgence of interest and discussion of how we might reduce work time.

On the intellectual level, a variety of think tanks have come out in support of the idea, ranging from the New Economics Foundation's (NEF) pioneering work in 2010, to centre-left stalwarts like the Institute for Public Policy Research, and even new and emerging think tanks like Autonomy.[2] Advocacy groups, such as the 4 Day Week Campaign, are also starting to rise up and push the idea. And books such as Paul Mason's *Postcapitalism* and my own book with Alex Williams, *Inventing the Future,* have strongly argued for making free time central to any future political project.[3] Political parties have been following suit as well, with the Green Party proposing a four day working week and a national measure of free time, and the Labour Party offering more bank holidays and suggestions of support for a shorter working week.[4]

Unions have also started to take issues of free time more seriously. In 2017, the National Union of Rail, Maritime and Transport Workers (RMT) set out a 32 hour work week with no cuts in pay as a core demand in future negotiations.[5] This is a crucial issue (and opportunity) for RMT as many jobs in transport are threatened by automation, from driverless tube carriages to self-service ticket dispensers. The Communications Workers Union (CWU) faced a similar situation when new sorting machines were introduced and automated much of the labour involved in sorting mail. Employees were faced with having more work added elsewhere to make up for this increased productivity. Instead, the union successfully fought for those productivity increases to directly benefit workers by moving from a 39 hour work week to a 35 hour work week.[6] And in September 2018, the Trades Union Congress (TUC) made waves by announcing that they would be aiming for a four day working week, albeit with a timeline that stretched into the next century.[7]

Businesses are also making the shift. A Gloucester based firm, Radioactive PR, recently moved to a four day work week with no cut in pay, after a six week trial experiment showed it had significantly beneficial effects. Every employee reported feeling more refreshed and mentally healthier, and the firm gained new clients during their trial period.[8] Tech companies are particularly attracted to the shorter working week idea: for instance, the London based firm Normally moved to a four day week in 2014 and the Edinburgh company Administrate joined them in 2015.[9] Both of them found it improved employee morale and reduced turnover, with only minor impacts on overall output. (At Normally, only one person has left in the last 4 years). While this corporate take up of a shorter working week remains a minor position, there are nevertheless a growing number of companies around the world who are finding that it can benefit their business and keep workers happy.

Is a four day work week by 2035 plausible? Given the current pace of changes, in hegemonic common sense, in party pledges, in union demands, and in

business practice, the answer appears to be 'yes'. However, major hurdles remain to the fulfilment of this project. If we are to ensure that automation works for workers, and does not just further line the pockets of employers, then there are a few things that need to be done.

The first, and perhaps most important, is to reckon with the landscape of power. While businesses may see some benefits, the fight for free time demands a major shift of power from capital to labour. Even if productivity increases are sufficient to offset the increase in wages per hour, the tightening of the labour market that a shorter working week will bring means that workers will gain in power. As such, advocates of less work should expect heavy resistance to the proposal.[10] Strikes and collective mobilisation will be essential to achieving these goals, and legislative reforms, such as repealing the Trade Union Act of 2016, which requires a 50 percent turnout of workers for ballots to be valid, will be necessary.

There is also the question of whether the successes seen by large unions can be applied to smaller grassroots unions organising in the gig economy, the care sector, and elsewhere. The risk is that some of the biggest unions may see successes, while the rest of the economy continues to work long and dreary hours. For their part, the large unions often rely upon what Beverly Silver called 'workplace bargaining power', where workers have power because they occupy a key location within an industry or an economy. The RMT, for instance, can exert power by shutting down London transport – which is one reason why Boris Johnson wanted to automate the tube.[11] Smaller unions must instead build 'associational power', which arises through workers collectively organising together across divides. If the fight for free time is to go beyond sectoral interests and spread across the economy, it will require these grassroots unions working together.

Fortunately, this is precisely what grassroots unions have been doing with some of the most imaginative and successful campaigns in recent years, whether organising cleaners across institutions, bringing together gig economy workers, or mobilising renters.[12] And all these campaigns have sought to build solidarity beyond just the immediate sectoral interests and beyond the workplace. In an age of automation, where job losses reduce bargaining power, associational power may be our best hope in making technology work for us.

Lastly, there are questions of implementation. Should a shorter working week be implemented all at once, or instead incrementally brought in (perhaps by linking decreases in work time to increases in productivity, as suggested by the

IPPR)?[13] Is it sufficient to implement it sector by sector (via union struggles), or is an economy-wide approach necessary (via legislation)? Still more questions arise surrounding the indirect effects of a shorter working week. Some jobs, for instance, require longer hours. How should they be organised? Some of society's institutions, such as education, are currently organised around a five day week. How should they be changed, if at all?

Perhaps the biggest question, however, is whether society can untether itself from its puritanical mores. Can we ever cease to believe that 'hard work' is an end in itself? To be sure, the identification with wage labour is strong, and the social value attached to it remains widespread. Yet everywhere we look we can see a yearning for a different way of living. We continue to value retirement (the closest thing to a post work world most people have), weekends are always enjoyed and Mondays routinely deplored, and holidays continue to show people the joys of life outside work. While shifting cultural norms around work may be a major challenge, it is vital if the economy is to shift to a new organisation of work.

Automation is only a threat to a particular idea of society: one where people must spend a substantial portion of their time in subjugation to someone else. If we relinquish this constrained imaginary about the future of work, we can see that automation is a major opportunity. A four day work week would be an immense accomplishment and major step forward for society, a moment where we collectively insist that free time is the basis of freedom and that there is a life beyond work.

The fall of the cathedrals

NICOLAS COLIN

**Developed economies have gone through several paradigm shifts
since the Industrial Revolution. Each was triggered by the rise of a
new general purpose-technology, such as the steam engine,
the Bessemer steel process, and the automobile. In turn, those
technologies contributed to radically transforming production,
consumption, and ultimately our entire way of life.[1]**

Today's shift is between two very different worlds – the Fordist Age of the
twentieth century and the Entrepreneurial Age of the twenty-first – and workers
have once again found themselves at the sharp end of the revolution.

For most of the twentieth century, workers were protected by large Fordist
corporations. These titans were exceptionally resilient because they enjoyed the
stability derived from the welfare state, a well-regulated banking system, and
suitable industrial regulations. In turn, they could provide individuals with steady
jobs that eventually became the catalyst for much more than a form of work: a
predictable income, generous social benefits, amplified representation through
strong trade unions, and access to affordable housing and consumer credit.

But then those large organizations started to weaken as an institution, and
steady jobs along with them. First it was because the Fordist Age entered
a phase of exhaustion from the 1970s onward, with globalization and then
financialization taking their toll. And now it's because of the rise of a new
general-purpose technology: the bundle of computing and networks.

For a long time, building a large, integrated organization – a "cathedral", as
coined by Eric Raymond[2] – was rational. It was the best way to secure assets

and employ a large number of workers whose labor could be streamlined along a given value chain. On top of that came economies of scale, which made it possible to lower the unit cost of production as that production scaled up. This is why the Fordist Age came to be seen as the age of mass production.

But today, the rationale for building cathedrals doesn't exist anymore. Put simply, it was destroyed by the accelerating rise of computing and networks. Indeed, there's more and more computing power in the world, and it has become ubiquitous, found not only in personal computers and smartphones but also pooled by large cloud computing platforms and embedded in basically every device. In turn that has driven the birth and growth of networks that never cease connecting individuals to one another.

An economy driven by ubiquitous computing and networks is a whole different game for businesses. Its main rule is that there's now more power outside than inside organizations. To quote Nilofer Merchant, "across industries and worldwide markets, buyers are not parked at the end of a value chain, but often in the middle of its flow".[3] That's because computing and networks make it so easy to orchestrate interactions between customers and to collect the data they generate at a large scale.

An immediate consequence is that the most competitive businesses are now those which excel at harnessing that power vested in billions of individuals using networked applications – like Google collecting user-generated data to train its algorithms, or Amazon relying on its own customers to contribute with product reviews. Those businesses are not cathedrals like in the past. Rather they are outward-looking, software-driven organisations entirely dedicated to sealing an alliance with an engaged community of networked individuals.[4] And in an economy dominated by such organisations, it's consumers that now wield the most power – not workers (who were strong in the 1950s and 1960s) or shareholders (who took over as the dominant party from the 1970s onward). Indeed many people believe that tech giants are at the top of the economic pyramid. But those who really set the pace are the individuals as consumers, because tech companies are so reliant on the power they wield as a network.

Second, an economy driven by ubiquitous computing and networks is driven by increasing returns to scale:[5] the value that a company creates increases faster than the size of the network of individuals using its applications. An adverse consequence of that is widespread instability. Because of increasing returns, growth curves are now exponential rather than linear. The winning company usually takes most of the market,[6] leaving little room for lesser competitors.

But its dominant position depends on the strength of the alliance sealed with the multitude of Internet users. If customers become disenchanted with the product (because of a design that ceases to match ever-growing expectations) or the company (because it doesn't inspire trust anymore), they can easily migrate to a better product. Large tech companies are fiercely competing against each other, constantly seeking to diversify by invading the other's ecosystem. And there are always well-financed upstart companies striving to enter the market.

What does it all tell us about the future of work? From a worker's perspective, there are two options – the new economy and the old economy – and neither of them is very attractive.

On the one hand, a growing proportion of individuals work in the new economy. But whether they are workers with an employment contract or self-employed workers chasing gigs on platforms, their working life is difficult. Today's customers are so empowered by computing and networks that they've effectively turned into impatient, whimsical bullies storming into the workplace and telling the workers to serve them better and to make it quick.

Because workers are not organized to resist this pressure, they're bound to consent to degrading working conditions – whether it's the harried workers in Amazon's ever-more-efficient warehouses or the software and marketing teams being constantly evaluated on their capacity to enhance user satisfaction. And this doesn't mention the fact that because of the harsh competition, all tech companies, however large, feel like they're giants with clay feet. Like MySpace, Fab and Yahoo, they can be wiped out of the market, and fire their employees, if they fail to keep pace with what empowered users demand. It's because they realize their own fragility that some of them have embraced continuous innovation as a strategy, while building those "moats" that are designed to protect their position. Think of Apple's valuable brand, Amazon's world-class logistics, and Google's massive salesforce guarding the gate to the advertising market.

On the other hand, the majority of the workforce is still working for those cathedral organizations born in the old paradigm. The problem is that those organizations don't have the ability to compete in the new economy. As cathedrals, they have been designed to concentrate power on the inside, not to harness power from the outside. Workers may have the impression that they still have steady jobs, but in fact, those jobs have a great deal of uncertainty. Employers that belong to the old economy are so fragile they can go bankrupt and shed most employees overnight, as we've seen with Kodak, Blockbuster, Toys"R"Us, and Sears. And those which manage to survive do so not because they innovate, but because

managers are doubling down on the search for efficiency, tightening the bolts and demanding more sacrifices from workers. Employees may still have a job, but they are expected to work harder in exchange for a lower wage while renouncing most of what used to make their job steady, secure, and attractive.

What could make the future of work brighter in both parts of our transitioning economy?

First, we must invent the new institutions that will make work in the new economy more rewarding and attractive. This won't happen by forcing businesses following the new paradigm to fit into the categories of the past. Rather we need to reinvent everything that used to make work good: trade unions, social insurance, the housing market, occupational licensing, consumer finance, and the employment contract itself. This is what many new organisations are working on at the moment: among many examples are Point and Divvy, two US startups tackling the tough challenge of reinventing housing finance to account for the terrible state of the real estate market; Lambda School, which teaches code to non-tech workers, paid for by a capped share of future income; and Trupo, a business born out of the famous Freelancers Union in New York, that provides freelance workers with short-term disability insurance.

Second, workers themselves are taking the matter into their own hands. Particularly interesting is the world of freelancers and gig workers, who have the flexibility to organize both their work and their connections with other workers as they please. Thus it's easier for them to organize as a network, making the most of technology, than it is for traditional employees. These workers are inventing a form of economic security that matches a world wired by computing and networks. They're using tools such as Facebook and WhatsApp to join forces and organise. They're also developing their own mechanisms to cope with what the new labour market is about, such as Alia, a spin out of the National Domestic Care Workers Alliance, that provides house cleaners in the US with an online platform for portable benefits.

The goal now shouldn't be to repress those discoveries and force those workers to fit the employment contracts of the past. Rather we should see them as the vanguard that explores what the future of work is about and discovers its new institutions on our behalf. Consumers hungry for more convenience and lower prices are the ones that must be invited to contribute to that effort. What they'll gain in the process is a digital economy able to serve markets in a more sustainable and inclusive way. It's now up to us to hasten the pace toward this new Golden Age.

The quantified workplace

DR PHOEBE V MOORE

Why do people self-track their steps, heart rate and sleep patterns?

The Quantified Self movement, which started in the mid 2000s, says it can offer significant physical and mental health improvements. Everyone, it is argued, can find empowerment through self-measurement. But what happens when monitoring tools, RFID tags, sensors, and predictive analytics, enter the workplace? Can we trust management to use these devices and the data they collect responsibly? Are the trade offs, greater productivity in return for a loss of anonymity, worth it?

Monitoring tools come in various guises. Some track the whereabouts of workers, such as the OccupEye heat sensor that checks when workers are at their desks and fingerprint login technologies that know who precisely is clocking in and at which times. Other tools observe the activities of workers, for example the frequency of strokes on a keyboard or which files are opened on computers. More sophisticated tools can monitor interactions between workers. Humanyze, for example, is a credit card sized device that can be worn by employees to monitor their mood and understand team dynamics.

Some of these tools and methods have been in existence for years. However, the quantified workplace has taken a new twist of late with the advent of predictive analytics, often powered by artificial intelligence. Once limited to assessing the past behaviours of workers, monitoring tools are now making bets on their future performance. Predictive analytics can assess which candidates are the best fit for a job (e.g. with AI used to judge verbal and non verbal cues

in video interviews), whether current employees are about to jump ship (e.g. by identifying key words in email subject lines), and whether staff are likely to take sick leave.

Advocates of monitoring and tracking experimentation say the quantified self is the liberated self. Not only can these tools boost productivity, we are told, they can also protect the health of workers and limit the potential for biased decision making. Software like RescueTime, which calculates screen time, aims to flag when workers are toiling excessively. Microsoft's AI enabled 'smart camera' was created to spot unmanned tools, spillages and other health risks in the workplace. As for recruitment, Infor Talent Science says their hiring algorithm led to a 26 percent rise in African American and Hispanic hires in the industries it was used.

Is this enough to warrant merciless monitoring? The answer, I would argue, is no.

For starters, the ability of monitoring tools to reduce discrimination is far from guaranteed. Algorithms are often trained on data that reflects biased decisions made in the past, which mean they bake in prejudice rather than eliminate it. Take the case of Amazon, which earlier this year discovered that its recruitment algorithm was discriminating against women. This is because the algorithm was trained predominantly using the data of CVs from male candidates, who made up the bulk of previous applicants at Amazon.

Monitoring has also been demonstrated to lead to high turnover rates, workplace restructuring and worker stress and anxiety. *The Guardian* journalist, Adam Littler, experienced these effects first hand when he spent time as a 'picker' in a UK based Amazon warehouse. During his stint with the company, he was obliged to wear a device that told him what to collect and the time allotted to do so. The device tracked his picker rate, equipped with a warning that he could be held to account, warned, and even disciplined, if mistakes were made.

As described by Littler, during 11 hour shifts, workers "are machines, we are robots, we plug our scanner in, we're holding it, but we might as well be plugging it into ourselves … [workers are] literally working to the bone and there doesn't seem to be any reward or any let up … the pressure's unbelievable". Another worker said conditions were like that of a "slave camp". Five years on from this investigation and the scale of monitoring in distribution warehouses seem only to have grown. Indeed, earlier this year, Amazon patented a new armband that physically vibrates to guide workers' arms to the correct shelf location.

The tyranny of surveillance is not limited to warehouses. A recent ethnographic study of long distance truck drivers showed that electronic monitoring led to them feeling pressure not to take mandated breaks. In the US, a Californian worker took her employer to court after she was allegedly dismissed for uninstalling a cell phone app that tracked her whereabouts 24 hours a day. The plaintiff claims her manager used the device to monitor her driving speed outside of work hours.

Philosophically, the spread of monitoring is challenging workplace values. By prioritising the quantifiable, we may be expected to reject or ignore the qualitative aspects of life. Global capitalism is a system of increasingly empty 'selves', subject to unending social reproduction, where data simply confirms an order it has already prefabricated. Quantification serves to shut down the possibilities for spontaneity and for undefined vitalities in workplaces. It may be easy to measure the speed of typing and the number of sales made, but putting a figure on charisma, creativity and solidarity is another matter. Once metric driven technologies are implemented for performance management, categories of what is considered productive or good practice are set a priori and often do not involve worker facing discussions.

Even if we can agree on what to measure in the workplace, would it ever be possible to do so without sowing divisions between workers and raising the bar to increasingly impossible heights? The fully quantified workplace resembles a sporting competition where technology aids athletes by identifying peak performance times and offering rapid feedback. Yet only a few people can win in the circles of the Olympians. Quantifying work in offices and factories as though these places are race tracks only serves to cut out qualitative questions such as equality of access. If we pit workers against one another, we will undermine the precious role of organisations in providing a civic space for building communities and relationships that are ultimately, not quantifiable.

It is still to be seen to what extent new forms of workplace monitoring will become normal practice and how much data will be used to make workplace decisions. The good news is that we now have the EU's General Data Protection Regulation (GDPR) to guard against some misuses of data. While it predominantly strengthens consumer rights, the significance for worker data collection, usage, and storage is important. Workplace decisions about people can no longer be made using automated processes alone. Neither can e-recruitment practices be applied without human intervention. These are significant changes for companies. In particular, gig platforms that rely on algorithmic decision making to nudge drivers and riders without them knowing.

Yet the GDPR comes with multiple loop holes. It stresses the importance of keeping workers informed when machines are tasked with making decisions. But companies otherwise have carte blanche to use monitoring tools as they see fit. It is not impossible to imagine a future where human resource departments routinely use recruitment algorithms trained on biased data, where workers in every retail store and warehouses have their toilet breaks timed (with little sympathy for the needs of women and disabled workers), and where office employees find their every finger stroke and email scrutinised with a fine tooth comb.

Management theories and work design methods have, of course, always tended to prioritise 'performance' over all else. They were invented to drive up the productivity of workers and push companies to their ideal state, where strategy and operations prioritise the bottom line and resilience of organisations. But with the introduction of new technologies, including artificial intelligence, there are new questions to grapple with. How well do we want our bosses to know us? Why do we think machines are intelligent? Is the capacity to measure the highest level of intelligence? If so, we need to start asking, exactly what are intelligent machines measuring, and what is at stake? My concern is not just that we are struggling to answer these questions. It is also that we are barely posing them.

This isn't the future we're looking for

AZEEM AZHAR

Becca woke up. If, indeed, you could call it waking up. With half inch walls to her 68 square feet of living space in Villa ("Co-living as you always dreamed it would be"), a sound sleep was a rare luxury. The irregular background human chatter emphasised the co- rather than the -living. And there was the fluorescent penumbra of the screen above her bed. Its ghostly advertisements demanded her attention throughout the night. A tempo of three acknowledgements throughout the night for a week was enough to earn an extra day in Villa.

The alarm jabbered. Having a device no longer surprised her. Growing up, her father bragged that Becca's generation would invoke a man-machine syncretism. "We're putting it behind us. It'll disappear into the walls, or into us." Well, for some it did. But meaningfully wiring technology into our brain stem was orders of magnitude harder than the technologists of the 2020s predicted. Even today, those neuroanatomical interfaces were restricted to the severely injured or those foolhardy or unlucky enough to be committed to some high risk military enterprise. For the rest, devices (thin; foldable, nay, scrunchable; ever connected and always listening) were the norm.

The screen glowed: jobbes were available within 15 minutes travel, all starting in the next 20 minutes. Alert after alert of elder care homes, a haggard cornucopia. Short, pleasant ones: chaperone a party to the coach station. Long, tiring ones: act out a story for an elderly woman. Long, taxing ones: handle the toilet routines for 30 nonagenarians with age related cognitive impairment.

Her rating still qualified her for the occasional pet job, albeit by a whisker. Walk two CRISPR perfect labradors; escort an unedited and thus extremely rare poodle to the groomers; house sit a Burmese cat for two hours. Professional work, in marketing or life coaching, were beyond her horizon for at least a while longer.

Logistics had long moved to the realm of the pavement robot, trundling along, sweating it out 20 hours a day for a few kilowatts of juice, and vast platoons of autonomous vehicles shipping what can't be 3D repped locally.

As for construction, her Mandarin cultural awareness was too low to qualify her for any East London building work. The Gujaratis and Poles had long despatched to the North West, Cricklewood and beyond, far out of her range.

As she wondered what might have been, notes were streaming in for the jobbes that she could qualify for. The prices were dwindling at a rate, as giggers offered their services for less and less. Fuck.

She'd have to get something, she needed money to demonstrate some headway to Uwork. No jobs meant no commissions for Uwork, and she'd be off the platform: "Uwork respects the individual needs of all its partners. If you aren't getting jobbes with us, it's better for you to find a platform which suits your temperament and skill mix." And being kicked off Uwork might mean eviction from Villa.

Uwork was bad. There were few well paid jobbes available, like stewarding and overseeing autonomous systems. Becca wasn't up to speed on the current approach to algorithmic reliability engineering or failsafe monitoring. Nor was there anything more human, more connected, like a longer term gig where you could build a relationship with one boss.

Uwork didn't offer these, and Becca's bet on becoming a self financing influu-moter last year meant she missed a refresher course on performative empathy. No recent creds on algorithmics or empathy meant no access to Finest ("The finest work for the finest humans"). So Uwork it was. And below Uwork, the last remaining gigging platform was Worka: the worst jobbes, the worst rates, the worst. A good jobbe on Worka would be backbreaking, dangerous and ill paid.

It was frustrating. Because, well, she still had some money. Thousands, enough to live and laugh in Villa for another few months. The remnants of her successful video stint influ-moting OilSlick and CarteBlanche sit in her bank account. But there wasn't enough there to live off the interest.

And today you need money to make money. Becca needed to prove she could continually earn: a reputation, best provided by great ratings for great jobbes, and an income afforded by those same jobbes. Prove it to Villa, prove it to the Oyster gates that gave her access to bikes, scooters, the old Tube and the hyperloop. No income, no access and it was walking or the five decade old Boris buses, retrofitted with tired electric motors.

Her brain did some calculus. Walk the labradors? It's only two hundred quid, a couple of hours. But she can do a great job. Edited pooches were playful but obedient. Charm the owner. Score a rating. Knock off a perfect jobbe for Uwork. And two hours jogging round Clissold Green with a pair of pooches is far from the worst thing in the world.

Only as she was figuring this out, the bids were coming in. 180. 175. 170. 160. "Fuck it! 120 take it or leave it," she punched. A confirmatory bleep. And the privilege was hers.

The job details arrive. It activated in twenty minutes. Payment fines and ratings penalties instantiated two minutes later. All told, Citymapper gave her seventeen minutes to get there but it would mean the dilapidated 114 Boris bus, scooter and stroll. She'd chance it without a stinking, ochre jalopy. Her call: scooter, sprint and sweat. Lots of sweat.

STOP.

The future could look like this. Our protagonist's life is driven by trends we can already pick up today. The barbelling of multiple dimensions of human life: of equality and access to resources, with the rich and the old at one end of the distribution and the poor and young at the other.

Automation may result in the elimination of a large number of routine tasks, and with them, many jobs. In a service dominant economy like London, this means swathes of middle office roles, in accounting, admin and marketing, evaporating over a decade (rather than in a matter of a few years). Many of these roles are sufficiently routine to be targets for automation, especially in a high wage market like the UK.

New classes of work will emerge, but they will demand high levels of specialist training. Some will involve designing or looking after artificial intelligence systems. Other jobs will tend to the systems of human intelligence and demand empathy and character. What is left, besides these desirable extremes, are jobs

where the cost of capital equipment is higher than the labour pool available. No one needs a bot to clean out an old building if there is a reserve army of workers waiting on an app notification.

Gig work will probably become an alternative to long term, stable employment. This is not necessarily a harmful trend; platforms have it in them to become a liberating and enabling technology. But for that to happen, workers must have rights relative to the platforms (and the buyers using those platforms), and some kind of safety net that works for a world where gig working is the norm.

Our protagonist's world has no such protections. So her choice to explore an entrepreneurial endeavour as an individual marketer results in a Kafkaesque trap. Her attempt to liberate herself from the whims of demanding buyers failed, and so she slips down a rung. And while this plethora of systems is second nature to her (she grew up with them after all) her stresses don't help the quality of her decision making.

In the future, income poverty will beget others forms of poverty, including of time (many workers will be forever on call) and of attention (some will be unable to escape the glare of their screens for fear of missing a gig). There will be little opportunity to build social capital within a collective of co-workers. Nor will people be able to accumulate the tacit knowledge that comes with the consistency of the same kind of work.

Mediocre gig platforms could treat workers as a lump of labour, with little or no incentive for them to be more than that. Their meagre attention becomes the main resource with which she can barter. The cycle continues because their data trails show them as precarious, impetuous and under skilled.

This future might sneak up on us in a number of ways.

We might be market ideologues and leave it to the market, unimpeded by normative considerations of the kind of society that we want.

We might trap people in their data trails and use past transgressions to hold them back, rather than finding ways of using that data to liberate or enrich them.

We might deny the realities of underlying technological and systemic trends that present no less than a paradigm shift for our societal institutions. Gig working is not good or bad, but it will be a reality. And AI, while adopted by

few organisations today, will be ubiquitous within a few years. Such denials will result in the wrong type of interventions.

Change is coming. It will be complex, multi layered and fractal. Accepting, understanding and embracing that change will allow us to design the architecture of the coming decades.

Yes, we can make those changes work for Becca (and the rest of us).

Forewarned is forearmed.

The rise of the planetary labour market

MARK GRAHAM

2018 was the first year in human history in which a majority of the world's population is connected to the internet. The internet is therefore no longer a network that primarily connects wealthy people in wealthy countries. The rest of the world is quickly coming online, and only about a quarter of the world's internet users are now European or North American.

One of the most significant implications of this connectivity for many people outside of the world's economic cores is the creation of a planetary labour market in which millions of jobs can now be done from almost anywhere on Earth. A mass migration of labour, but not of people.

Some of the impacts of this planetary labour market are being observed in the most unlikely of places. Last year, I visited an artificial intelligence training centre in a rural town in Central Africa. Getting there involved a day-long drive from the nearest international airport, into a region that, at first glance, appeared worlds away from the global economy. It was here, in a place where many people still live in thatched huts, where a lot of the roads are unpaved, and where few families posses any of the technological gadgets of the contemporary world, that workers are helping to build some of the world's most advanced technologies and services.

In a large open-plan office with hundreds of desks and computers, one of three shifts of workers are crammed together into the building. They spend eight hours a day doing highly repetitive work like matching names to photographs of minor celebrities that they've never heard of, or identifying objects on photographs of

suburban American streets in cities that they will never go to. What these tasks have in common with the dozens of other routines performed in the room is that computers cannot yet perform them as effectively as humans. Real people are needed to structure, classify, and tag an enormous amount of unstructured information for companies using machine learning algorithms in products like autonomous vehicles and next-generation search engines.

What is most interesting about this work is that the workers themselves are never actually told much about what they are doing. They know, for instance, that they need to repeatedly tell a computer what the difference between a tree and a building is; but are never told anything about the end client, such as their name, location, what they actually need all of this information for. This is the ultimate in alienated labour: people doing work for companies they know nothing about, building products and services they will unlikely ever use.

Here it is worth remembering that some of what we are seeing now is far from new. The mass outsourcing of manufacturing from high-wage to low-wage economies began in the 1970s. The 1990s likewise saw a significant amount of jobs outsourced and offshored in the IT services sector. In both of those industries, outsourcing firms faced substantial risk and cost to reconfigure their production networks to take advantage of what some people referred to as a 'global reserve army' in distant labour markets. However, the planetary labour market that some firms are attempting to build today is qualitatively and quantitatively different from previous rounds of outsourcing in three primary ways.

First, the nature of work itself has changed. One outcome of computerising and digitising almost every profession has been the increasing modularisation and standardisation of work. At the moment, a lot of digital work is what you might think of as the low-hanging fruit of modularisation and standardisation: jobs like transcriptions and data entry. However, there is no reason why ever more processes from all sorts of other jobs couldn't be modularised and broken up into chunks to be outsourced. With enough pressure to cut costs, so-called 'higher skilled' professions like teachers, lawyers, and doctors could all see parts of their work processes standardised. This fact contributes to the commodification of labour power by allowing work to be traded at the level of the micro-task. As an employer, you can more easily hire on a per-click or per-task, rather than per-person basis. This is nowhere more visible than on global online outsourcing platforms such as Upwork.com or Freelancer.com that connect clients with workers anywhere in the world, sometimes to do tasks that might only take a few minutes. Those two platforms alone have a

combined potential workforce of 38 million people on them from almost every country on Earth.

Second, and while this may sound tautological, a core reason why we are heading towards a planetary labour market is because the market for a lot of labour is now truly planetary. In the past, labour markets needed bounded places and times in order for employers to find workers and workers to find jobs. But with most people in the world now connected to the internet, some of the spatial barriers that once defined labour markets are now less relevant. This is not an argument that geography is irrelevant. Far from it. What need would we have to outsource and offshore jobs if wage levels, skills, and the availability of workers in every place was the same? Economic geography therefore matters more and matters less at the same time.

So if we accept the first point (that ever more types of work can be outsourced) and the second point (this outsourcing can happen to ever more places), we arrive at a third. Namely, that a lot of jobs are becoming extremely footloose. To switch the location of a job from one place to another can now be as simple as sending some emails or clicking some buttons. There is often no need for companies to build factories or offices, train workers, or even pay local taxes. A small business in London can hire a freelance web developer in Mumbai one day and Manila the next. By quickly, cheaply, and almost seamlessly moving its production networks around the world in this way, the small business in London leaves behind no fixed infrastructure and no visible traces in the cities in which it was once an employer.

The hundreds of workers in Central Africa now training the next generation of autonomous vehicles, and the millions of distributed online platform workers in other locations around the world, are examples that show us not that work will go anywhere on the planet, but that it can. And while we have had a world marked by worries about offshoring for decades, we have never had one characterised by mass digital connectivity, or by labour commodified to such a high degree that it can be so easily and quickly transmitted across space.

One could argue that this planetary labour market carries the potential to accrue significant benefits for both labour and capital. Employers can find workers for any imaginable task, and workers are longer constrained by the limitations of their local labour markets. Indeed, the African machine learning trainers had highly sought-after jobs. They earned above average wages, and received job perks like free lunches and on-site childcare, a significant improvement from almost anything else available in the local labour market.

However, this example of a responsible employer sadly appears to be the exception rather than the rule. When labour is treated as a commodity to be easily bought and sold, it becomes economically irrational for the millions of employers engaging in outsourcing to invest meaningfully in workers. The employers in online outsourcing platforms, for instance, almost always tend to place the burden and cost of training, infrastructure, and risk upon the worker themselves. The global competition within a planetary labour market exerts huge downwards pressure on wages and working conditions. It is not uncommon to find instances of people working for below national minimum wages, or working 48 hour shifts because a highly precarious work environment makes them concerned about when they'll get their next gig. And as production networks quickly shift and reconfigure themselves across the surface of the globe, with jobs moved out of a place as quickly as they were moved in, it matters little to employers if labour power is left unused.

Every year hundreds of millions of new people from ever poorer segments of the world's population connect to the internet, and - like the rest of us - will be looking for decent work. Indeed, by 2035, the vast majority of the world will likely be online – even the world's very poorest populations. The world's poor will be thrust into the same globe-spanning context of competition with everyone else. But the situation described above is but one example of how capital, labour, data, computers, and a globe-spanning communication network can be interlinked.

None of this should be taken as an argument for autarky or a return to a geographically more bounded world of work. Just because a labour market can be everywhere does not mean it is nowhere, and this is why we need to continue working towards strategies that operate at a range of spatial scales to counter some of the worst problems associated with planetary-scale competition. We need regulation tailored to key source and destination countries of work; we need transnational agreements that set minimum standards; we need global alliances of workers and their advocates; we need international strategies of worker resistance; we need to look to nascent plans to create more democratic and worker owned digital companies and platforms; and we need transparent standards that signal to consumers whether employers acknowledge their moral responsibility to their workers. It is on that last point, that I am working with colleagues in the UK, South Africa, and India to launch what we are calling the Fairwork Foundation. We have brought together stakeholders (workers, unions, platforms, policy makers) in order to set core principles for 'fair work' in the platform economy. We are turning those principles into scores and an annual league table that

we will release to show how well or poorly each platform scores in every country. In the Spring, we will launch our first South Africa rankings, and we currently are seeking support to begin a UK pilot. Our hope is that these rankings will reward platforms that treat their workers well.

The Fairwork Foundation is just one attempt to think about how to grapple with a world in which there are few protections for many of the world's digital workers. And the coming into being of a planetary labour market ultimately means that governments, trade unions, civil society, and international organisations must all rise to the challenge of not just thinking globally, but also acting globally if we want a future world of work that is anything but a race to the bottom.

Note: This text is adapted from the original by Mark Graham that appeared in NS Tech, a division of the New Statesman.

A view from India

URVASHI ANEJA

Most conversations about the impact of emerging technologies on the future of work are dominated by the encounters, trajectories and needs of industrialised economies. But, in many parts of the world, earlier industrial revolutions are still unfolding, millions of people continue to lack access to basic services, and regular formal employment remains aspirational for most. Technology is also a social product meaning its impact will differ across social contexts and groups. Global narratives thus need to be localised and re-examined, otherwise there is a risk that dominant techno-imaginaries will remain misaligned with the needs of a bulk of the world's population.

Here I want to talk about what the future of work will look like in India. With over 7 million young people entering the workforce every year, and over 80 percent of the population engaged in the informal economy, securing decent work is an urgent and pressing priority, even without factoring in the impact of technological disruption.

The future world of work in India is likely to be characterised by three features:

First, the number of good jobs are likely to decrease, restricting socio-economic mobility. Despite high rates of GDP growth, bad jobs continue to outnumber good jobs. The bulk of India's labor force is engaged in the informal economy, where jobs are characterised by low wages, little security, poor employment conditions, and devoid of formal social protections. Many work as daily-wage, manual labor in the agriculture and construction sectors. For many of these workers, a 'desk-job' or a 'white-collar' job in the formal or organised sectors

of the economy represents a way out of poverty and insecurity. Such jobs are already very few – some studies estimate that less than two million were created in the previous year. As businesses adapt to new technological possibilities, many of these jobs will further disappear. This is already observable across numerous sectors – from chat bots in the financial sector to automation of basic data entry jobs. At Bangalore airport, one of India's fanciest and busiest airports, self check-in kiosks were introduced a year ago, and last month the baggage drop-off desk was also replaced by a smart machine.

The automation of entry-level positions, typically those involving routine and repetitive tasks, are likely to restrict opportunities for upward socio-economic mobility for many millions of Indians, restricting opportunities to transcend fissures of formal-informal, urban-rural and caste and class. Moreover, the manufacturing route to prosperity may no longer be available to India as the availability of advanced automation technologies ushers in a process of premature de-industrialisation. Giving a leg up to India's unskilled or low-skilled labour will thus become even more difficult.

Second, informality will be an enduring, if not accelerating, condition of Indian labor markets. The growth of the platform economy in India is likely to create new micro-entrepreneurial opportunities for workers. Yet, gig work is not new in India; most workers already work multiple jobs, with multiple employers, on a piece-rate basis, and without access to formal social protection mechanisms. Digital platforms are shifting many types of informal work – from plumbers and drivers – to the formal sectors of the economy. But for workers, the formalisation is only partial; income insecurity persists and the social security benefits associated with formal employment remain a distant dream. The platform economy is thus likely to reproduce if not expand informal and precarious conditions of work in India.

Workers are not without agency. In Bangalore, many drivers have left Uber to join a WhatsApp group that directly connects them with customers and other drivers. Drivers have also created a common chit-fund – a kind of credit association – among themselves as a means of safeguarding against unplanned shocks. But membership to this group is restricted to drivers that already know each other. Migrant workers that have recently moved to Bangalore, lured by the promise of high earnings on cab-hailing services, have limited access to such informal avenues for social protection. Not all workers will have the social capital necessary to weather uncertainty.

To remain nimble in the face of technological change, the organised economy is also increasingly shifting to contract and temporary work. The manufacturing

sector, for example, is witnessing a growth in employment, but the largest share of this is contract work, not permanent employment. Digital platforms and new communication and data sharing solutions are making it easier to break down work into smaller tasks and then outsource it to the most cost-effective bidder across multiple geographies. Indian workers have so far benefited from this shift. We are the largest supplier of labor on global freelancing platforms, with many Indians providing software and technology-related services to wealthy clients in Western economies. However, a large number of platform workers are engaged in more menial tasks such as data annotation and categorisation. In both cases, an over-supply of labor has meant a race to the bottoms in terms of wages and exploitative terms of engagement.

Third, socio-economic inequality is likely to deepen. India is already one of the most unequal countries in the world and labor's share of national income is in decline. Only those with the requisite skills will be able to leverage new opportunities – and these are in the minority. For women, and other marginalised social groups, low levels of education and skilling combined with prevailing socio-cultural norms and practices are likely to limit their opportunities. In India, less than 30 percent of internet users are women, while many drop out of the labor force and secondary education respectively due to family reasons and responsibilities in the home. Women are also more likely to occupy the low-medium skill level jobs that are most vulnerable to the effects of automation. The platform economy could give women greater access to flexible work, but this will also reproduce the gendered division of labor.

Predictive analytics and artificial intelligence technologies are also changing hiring and firing practices. The use of AI to hire staff and measure their performance could in theory root out the bias that is inherent in every workplace – a pressing problem in India due to its caste, class and religious divisions. Yet emerging evidence suggests that automated systems tend to reproduce these biases, either because of programmer bias or because of unrepresentative data sets. Workplace surveillance, too, could be a serious problem in India, particularly where job competition is high, labor rights are poorly understood, and conversations about data privacy are at a nascent stage.

Of course, the future world of work need not be so bleak, and certainly not for everyone. Technological innovation will bring tremendous productivity gains to certain sectors of the economy and specific social groups. India boasts numerous success stories – of entrepreneurs, start-ups, and industries that are globally competitive. Economic growth in India, however, is decoupled from employment growth; the Information and Technology sector, for example,

contributes over 12 percent of Indian GDP but employs less than 2 percent of the labor force. To ensure prosperity isn't confined to the lucky few, India will need to ramp up investment in infrastructure, education, healthcare, access to justice, and gender justice. We will also require new forms of social protection that specifically address the perils of informal work, as well as other labor protection and redistributive strategies.

Further, technology trajectories can, and should, be shaped to align with broader societal goals. Certain technological choices might be more suited to a labor surplus economy like India, while others may be more appropriate from an equity perspective. Automating manual scavenging for example is preferable to the roll-out of driver-less cars. We need to shift from the current framing of innovation possibilities in terms of sectoral advances, to a socio-technical view of innovation that considers not only expected productivity and efficiency gains, but also the distribution of these gains across society. At stake are the livelihoods of 1.3 billion people.

Endnotes

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