

## Thematic Investing

## Robo Sapiens: Future of Work Primer

Thematic Investing

*This is a redaction of a 155 page report published May 12, 2021***The US\$14tn duo: man & machine on the same team**

The future of work is not zero-sum between humanity and technology. We believe humans can collaborate with and work alongside robots, rather than be displaced by them, and that technology can create more jobs than it destroys. By 2025 alone the WEF thinks automation will add 12 million *net* new jobs with robots eliminating 85mn jobs but creating 97mn new ones. Other grounds for optimism include: (1) 65% of children starting school today will work in jobs that have not been invented yet; (2) 'new' collar jobs will be generated from well-placed thematic sectors like healthcare, renewables, new mobility or even moonshot technologies and (3) we might actually be more productive and have more leisure time if robots can relieve us of more mundane, repetitive everyday tasks. We have identified \$14tn in market cap of enablers for the future of work. Technology, industrials and medtech are some key beneficiaries. We also see opportunities in education and the upskilling/retraining of workers by corporates. Conversely, commercial real estate/offices and legacy transport are some of the sectors facing headwinds.

**2020s: a decade of work transformation: tech, gigs, ESG**

We think the decade ahead will see unprecedented change in the world of work as tech disruption gathers pace. First, 100 million workers may need to switch occupations by 2030 post-COVID. Second, humans and machines could be spending equal amounts of time completing work tasks by 2025, with the global robot installed base doubling to 5mn units vs 2019 levels. Importantly, collaboration between humans and industrial robots ('cobots') is one of the fastest-growing areas with a +50% CAGR through to 2023. Meanwhile, the gig economy is creating employment opportunities, though it has muddied the legal definitions of work status, resulting in growing regulatory disputes (workers' rights, sick pay, etc). Hence, we think ESG/UN SDGs will be key as companies focus more on improving flexible work/health benefits, parental leave, childcare, etc.

**A new hope: pink, green and new collar jobs boom**

'Pink & green are the new white & blue': Pink collar = care economy, i.e., empathy jobs in social healthcare (doctors, psychologists, nurses), and education (teachers, childcare); Green = clean energy (solar/wind, EVs); and New Collar = technology, cyber, coding. The green economy will likely provide the 2 fastest-growing occupations in the US driven by the clean energy revolution. However, health and wellbeing-related professions (e.g., mental health) will account for 13 of the 30 fastest-growing American jobs in the 2020s.

**What will your Gen C (grand) children do for work?**

But in a Transforming World we ultimately need transformative jobs. So what are the truly futuristic jobs that could be invented? Data privacy managers, nanomedicine surgeons, lab meat scientists, blockchain strategists, space tourist guides, freelance biohackers, AI avatar designers, 3D food printer chefs, leisure time planners, ethical algorithm programmer, and brain simulation specialists to name but a few.

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**Refer to important disclosures on page 10 to 11.**

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MLI (UK)**What are the other futurist jobs?**

- Memory Augmentation Therapists
- Climate Weather Geoengineers
- Computational Biologist
- AV Ride Experience Programmer
- Cryptocurrency Lawyers
- Agriculture Rewilding Strategists
- Genetic Modification Engineers
- Virtual Reality Media Influencer
- Animal Extinction Revivalists
- Moon Mining Excavator

AcronymsESG: Environmental, Social and  
Governance

UN: The United Nations

SDGs: Sustainable Development  
Goals

## Did You Know?

- The time spent on current tasks at work by **humans vs machines** could be equal by 2025 – WEF
- We need to **reskill** 1 billion people by 2030, 1/3 of all jobs worldwide, because of technology disruption – OECD, WEF
- 1% reduction in robot prices and 5% improvement in **productivity** annually is expected over the next decade – BCG
- We spend 1/3 of our **life working** but less than 2hr a year on career plans vs. 2,766hr asleep, 946hr on leisure/sports and 321hr on education – OECD
- The number of Americans employed in **clean energy/efficiency** jobs is higher than the number employed as waiter staff in bars and restaurants across the entire country – US EESI, USEER
- 600mn **new jobs** are needed by 2030 (40 million pa) – ILO
- In 1870, workers worked more than 3,000 hours annually equivalent to a gruelling 60–70 hours each week for 50 weeks per year. Today those **extreme working hours** have been roughly cut in half – Our World in Data
- Henry Ford ‘invented’ the **weekend!** Many American workers used to show up 6-7 days a week for work in 1926. However, Ford decided to give his employees 2 free days, arguing that they would buy more cars if they had more leisure time. COVID could do the same for the 4-day week that Ford did for the weekend. – Bloomberg
- **Gen Z workers** are set to triple to 51 million by 2030 making up almost 1/3 of the workforce by the next decade – Oxford Economics, Snap, Bloomberg
- Increasing **infrastructure** investment by 1% of GDP could generate an additional 3.4mn direct and indirect jobs in India, 1.5 million in the US, 1.3 million in Brazil and 700,000 in Indonesia – McKinsey
- Investing in social care in 45 key countries could propel the care economy into achieving the **UN SDGs**, which would mean a total of 475 million jobs by 2030 – UN, ILO
- **New tech can create jobs.** IT revolution increased the number of jobs for information analysts as the cost of data gathering declined. Excel boosted demand for accountants as productivity improved. ATMs created more bank teller jobs as the cost of opening retail branches declined – McKinsey, WEF
- **Teachers** rank among the lowest in terms of the likelihood of having their jobs automated at just 27% – OECD
- The global **robot installed base** could hit 5 million units by 2025, doubling 2019 levels – BofA Global Research, IFR, World Bank
- Denmark spends over 2% of its GDP on **assisting/retraining** its unemployed workers whereas the US spends only 0.1% – OECD, Council Foreign Relations

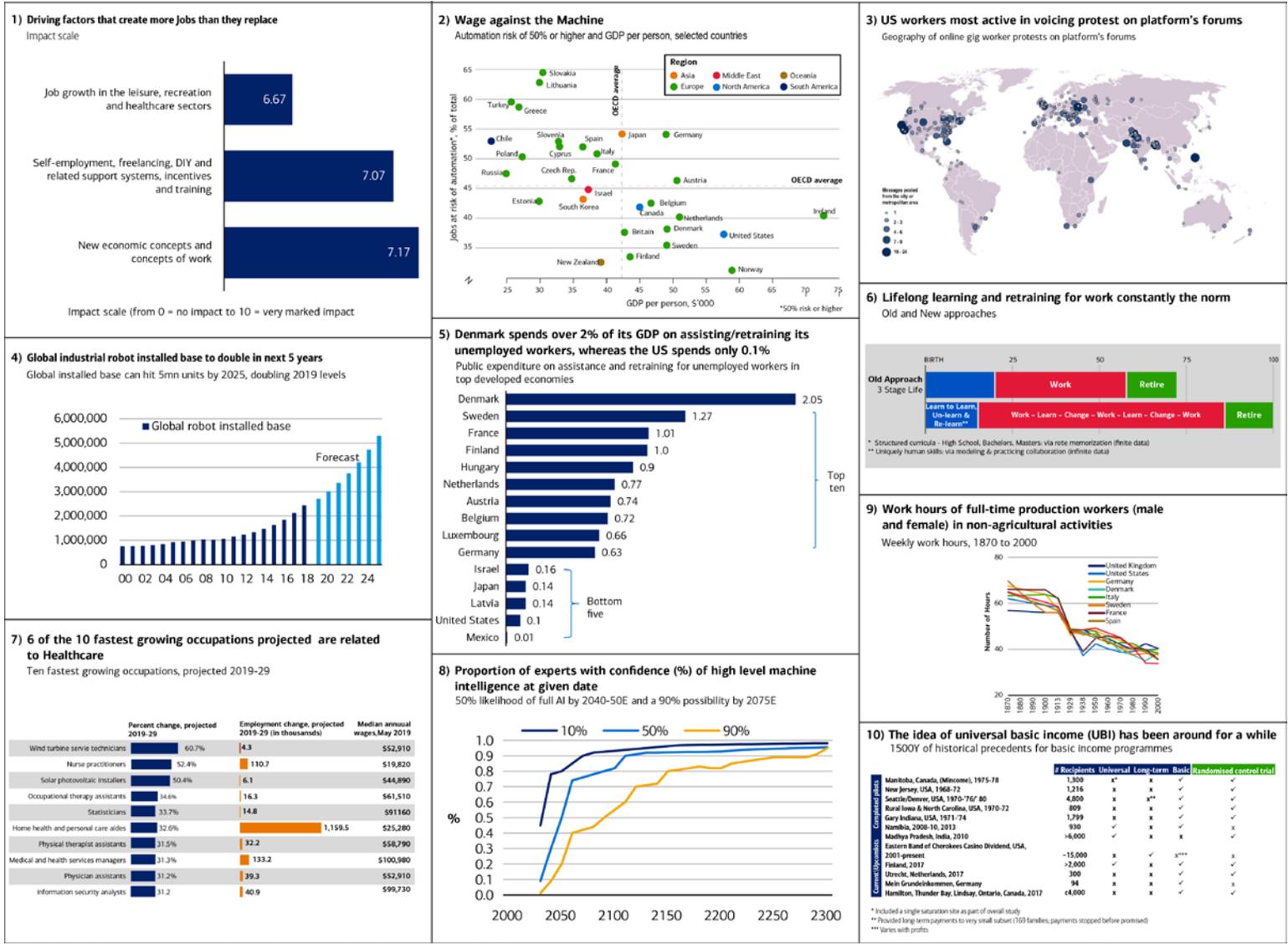




# Everything you wanted to know about future work in 10 charts

## Exhibit 1: Everything you wanted to know about the Future of Work in 10 charts

The future of work covers many areas from fastest growing jobs (6 out of 10 are related to healthcare) to the rise of robots (5 million units by 2025)



Source: 1) Bertelsmann Stiftung; 2) OECD; 3) Oxford Institute; 4) BofA Global Research, IFR, World Bank; 5) OECD; 6) SAP; 7) US Bureau of Labor Statistics; 8) Mueller and Bostrom; 9) Our World in Data, Huberman & Minns; 10) OECD

# Sectors: long term beneficiaries/challenged sectors in the future of work

**Table 1: Long term beneficiaries and challenged sectors in the future of work**

Beneficiaries are technology, healthcare, industrials whilst Challenged are legacy mobility, commercial real estate

Sector	Beneficiaries/Challenged	Future of Work Comments
<b>Communication Services</b>		
Telco Service Providers	Beneficiary	Work from home (WFH) after COVID will require better connectivity infrastructure but risk could be black swan that brings entire network down
New Media & Entertainment	Beneficiary	More leisure time in the very long term could benefit sector, Gen Z will drive faster shift towards eSports, video & music streaming consumption, Total Reality will be next gen media platform to enable this in the future
Big Tech Platforms	Beneficiary	Tech landlords accrue most of the capital in the future of work via their platforms (social media, messaging, online shopping etc) but face growing data privacy / antitrust / digital tax regulatory headwinds
<b>Consumer Discretionary</b>		
eCommerce	Beneficiary	Jobs growth outpaces bricks and mortar, online is king now with innovation in logistics (warehouse automation, same day/drone delivery), further growth in voice AI and social shopping to catalyse ecommerce
Homebuilders/Home Improvement	Beneficiary	Workers continue DIY home offices expansion trend, work from home theme to be long lasting with pockets or urban exodus meaning greater demand for rural suburbs
Consumer Services (Hotel/Travel/Food)	Beneficiary	More leisure time in the future could mean more time to travel abroad for recreation and dining out, fewer structural headwinds compared to business/corporate travel counterpart, disruption in food service jobs
Educational Services	Beneficiary	Key sector that helps workers transition into future jobs via lifelong learning, important enabler for retaining of workforce, childcare important for flexible work from home
Luxury Goods	Mixed	Uncertain implications from the future of work and jobs where increased leisure time could imply greater demand for luxury but also growing societal inequality could also be risk factor
Autos	Challenged	Pressure on ICE engine/autoparts suppliers jobs from EVs/AVs, less commute demand, growing demand for sustainability, continued improved air quality, consumer preference shared mobility
General/Apparel Retail	Challenged	Bricks and mortar sector facing high risks, retail jobs face the strongest automation threat, peak stuff theme and shift to online eCommerce accelerated post-COVID, fast fashion ESG sustainability concerns
<b>Consumer Staples</b>		
Alcohol / Beverages / Tobacco	Mixed	Uncertain implications from the future of work and jobs where increased leisure time could see imply greater demand for (social) drinking/smoking but face risks from Gen Z insular consumer total demographic cohort
Food Retail	Challenged	Sector facing strong disruption from tech and online innovation (food delivery, future contactless stores, automation), food preparer jobs among the highest at risk from automation
<b>Energy</b>		
Oil & Gas – Majors & Refining	Challenged	Increased stranded assets risks puts more pressure on jobs + EVs reduces oil demand, growth of renewables & energy storage, plastic backlash/patchwork risk also major headwinds for sector
<b>Financials</b>		
Payments	Beneficiary	Future implications of blockchain/cryptocurrency on sector could be jobs growth opportunity, cash is no longer king nor hygienic post COVID with the growth of mobile/eCommerce transaction volume
Banks / Insurance	Beneficiary	Highest potential for long term WFH without loss of productivity, fintechs disrupting traditional banking (FX transactions, digital, mobile), big data/open banking (PSD2), retail banking branches may have to close faster
<b>Real Estate</b>		
Industrial, Storage, SF Rental, Logistics	Beneficiary	Future work trends benefit sector with higher long-term demand for eCommerce logistics and reshoring manufacturing needs, Millennials/Gen Z to rent more rather than buy property with lower incomes
Data Center, Telco Tower	Beneficiary	Work from home (WFH) to accelerate demand for data intensive services like streaming, online shopping, edtech, eSports, 5G etc
Rural, Multifamily, Suburb	Beneficiary	Dwellers could increasingly move from urban to rural areas to avoid dense cities in the absence of peak urbanization
Offices	Challenged	Work from home trend post COVID, hybrid flexible work model, decreases demand for office in dense cities although companies may need more square feet, co-working and hot desking could increase
Commercial/Malls/Residential/Lodging	Challenged	Sector facing deflationary jobs impact from future automation, decrease in demand for commercial real estate, reduction in corporate travel to dent ancillary services, death of the mall with more online shopping
<b>Health Care</b>		
BioPharma & Biotech	Beneficiary	Pink collar jobs one of the fastest growing occupations, greater future work demand for scientists for innovation in AI driven drug discovery, helping to cure other disease (malaria, cancer, Alzheimer's, Parkinson's)
Life Sciences Tools/Diagnostics	Beneficiary	Genomics related jobs growing quickly, sector enables disease surveillance as the 'arms dealer of healthcare' by enabling nextgen human DNA sequencing, personalised medicine, biomarkers
MedTech / HealthTech	Beneficiary	Ageing population to drive growth in future work/jobs for sector, COVID= revolution in digital health, telemedicine, electronic healthcare records (EHR), patient data analytics, growth in robo-surgery
Healthcare Distributors & Services	Beneficiary	Retail pharmacies could be beneficiaries of more point of care diagnostics, but facing increasing Big Tech disruption (Amazon Pillpack) on PBMs distributors, telemedicine could also be risk for sector
Health REIT/Facilities/Hospitals	Beneficiary	Nurses, mental health, home health aides among the fastest growing occupations = beneficial for hospitals, senior living, skilled nursing facilities, retirement homes
<b>Industrials</b>		
Capital Goods	Beneficiary	Growth in industrial robots automation driven by IoT, sensors, big data, industrial software, collaboration between humans and robots (cobots) among one of the fastest growing areas
Defence	Beneficiary	Space theme could create new employment opportunities, increasing geopolitical tensions to spur spending on homeland security, tech war likely to increase focus,
Business Services	Beneficiary	Digital Consultancies benefit demand from companies' implementation of technology, Staffing providers also benefit as middle men for frictional work and retraining
Commercial Aerospace	Challenged	Risks from long term decline in demand for commercial aviation via corporate / business travel but leisure travel tailwinds could offer a ray of hope for the sector
Transport	Challenged	Corporate / Business air travel unlikely to fully recover post COVID, logistics among the bright spots for the sector but deglobalization and reshoring of supply chains could pressure future work/jobs opportunities
<b>Materials</b>		
Metals & Mining	Beneficiary	Infrastructure stimulus could boost jobs, COVID also accelerates climate change decarbonization which is positive for metals eg. EV demand for lithium, cobalt, nickel, gold, copper
Construction Materials	Beneficiary	Biden Plan and China One Belt One Road to boost new infrastructure spend to benefit cement/concrete, climate-resilient buildings, energy efficiency (insulation) = more future work/jobs
Chemicals	Beneficiary	Innovation in future food ingredients + EV battery materials could be good for work/jobs, but increasing ESG risk from PFAS, plastic backlash/petrochemical risk, ag chems fertilizers risk from peak farming theme
<b>Information Technology</b>		
Semiconductors	Beneficiary	Among the biggest beneficiaries in future of work/jobs with Moore's Law as the key enabler of AI automation and the connected world (IoT, sensors, chips, driverless cars),
Cloud, Software and Services	Beneficiary	Robot Process Automation (RPA) tailwind for sector, growing demand for coders and programmers, sector benefits overall from shift to dual computing creating future employment opportunities
Cybersecurity	Beneficiary	One of the fastest growing job professions, increasingly digital, AI, remote working dependent industries will need strong cyber privacy solutions to protect their businesses as well as expansion of networks
Tech Hardware	Beneficiary	WFH requires demand for smarter devices (smartphones, wearables, AR/VR headsets), 5G telco equipment capex cycle, IT engineer jobs growing rapidly to program machines in the future
<b>Utilities</b>		
Renewables / Integrated Utilities / PPs	Beneficiary	Green collar jobs boom creates new jobs in solar, wind, EV charging etc, COVID accelerates shift towards clean energy, storage and smart grids

Source: BofA Global Research

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# Executive Summary

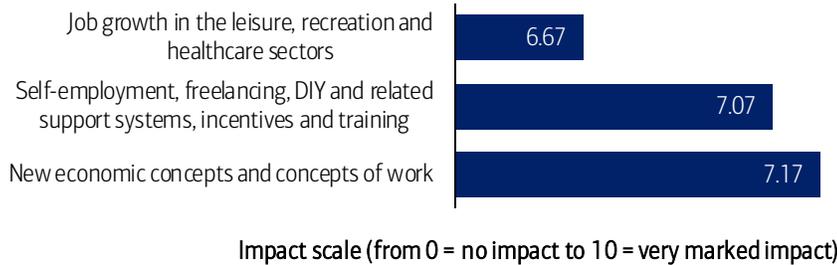
## Tech can create jobs not just replace them

- Technology is transforming the jobs we do and humans are adapting to this disruption.** We are already seeing this today with the rise of cleantech leading to a jobs boom in wind turbine service technicians and solar photovoltaic installers. We are also seeing growing demand for nurses, home aides and mental health counsellors as these roles need interpersonal and empathy skills that robots simply cannot automate. Furthermore we are also likely to see further expansion in creative jobs that already exist such as directors, musicians, and fashion designers. In other words, areas where robots are unsuccessful in replicating human skills – artistic, intuitive and relational. And finally, technology advancement could also lead to more leisure related occupations such as yoga teachers, sommeliers and dog walkers. Ultimately we think the future of work is humans *and* robots *not* humans *versus* robots as we believe net-net innovation will continue to offset the risk of mass job automation.
- Jobs growth forecast: so where will future work come from?** US employment is projected to increase by 6 million to 168.8 million from 162.8 million between 2019 and 2029. Healthcare occupations and associated professions, e.g., mental health will account for 13 of the 30 fastest-growing jobs from 2019 to 2029. However, the 2 fastest-growing US occupations expected this decade, solar PV installers and wind turbine service technicians, are in clean energy. In Europe, 3 sectors are likely to account for more than 70% of potential job growth through 2030: 1) human health and social work, where 4.5 million jobs could be added; 2) professional, scientific and technical services, which could create 2.6 million new jobs, and 3) education, which could gain 2 million jobs.
- Pink/Green collar are the new White/Blue collar:** We believe the 2020s will be the decade of the 'Care & Green Economy'. Pink collar (nurses, carers and, health aides) and Green collar (solar engineers, wind technicians and battery experts etc) are the new White and Blue collar professions. We are strong believers in both because: 1) they are high quality jobs that offer long term work stability; and 2) they are hard to automate because they require strong emotional intelligence and dexterity; and 3) they are exposed to sectors that are well positioned thematically i.e. healthcare and renewables.
- Care/Green/Infrastructure Economy to drive jobs boom:** 1) Care Jobs – by investing in social care in 45 countries, the care economy could achieve the UN SDGs which would mean a total of 475 million jobs by 2030, equivalent to 269 million new jobs (vs. 2015 levels) in an optimistic scenario according to the International Labour Organization (ILO). These jobs would comprise 171 million new healthcare jobs and 98 million new education jobs by 2030 alone. And healthcare would employ 270 million people by 2030 (vs. 99 million in 2015) and education care could employ 205 million (vs 107 million in 2015) 2) Green Jobs – the renewable energy sector employs 18 million globally as of 2018 but this could grow to 30 million by 2030 (implying 12 million new jobs vs 2018 levels) and 42 million by 2050 according to the International Renewable Energy Agency's (IRENA) most bullish scenario; 3) Infrastructure Jobs - finally industrial stimulus could also be an important job creator in the decade ahead, which brings strong gains for the wider economy through the multiplier effect. For instance every 1 new durable goods manufacturing job creates 7.4 new jobs in other industries, benefiting both suppliers to those industries (2.9 jobs for e.g. raw materials, energy, & equipment providers) and companies that depend on their spending (4.5 jobs for transportation, retail, services, etc.).



**Exhibit 2: Driving factors that create more jobs than they replace (impact scale)**

New economic concepts of work have the strongest impact (7.17) compared to job growth from sectors (6.67)



Source: Bertelsmann Stiftung

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- ‘Eureka’ Jobs – but what could future generations like your great-great-grandkids be doing for work?** Many jobs of the future are yet to be created where 65% of children starting school today will work in jobs that have not been invented yet. We are at the early stages of ‘Eureka! Future Tech’ where we think the exponential growth of moonshots technologies will create a new wave of professions that we have not even thought of yet. Some of these could include: Algorithm Insurer; Extreme Geneticist/Synbiologist; Leisure-Time Designer / Occupation Broker; Ethics Algorithm Expert; Ethical Technology Advocate; Freelance Biohacker; Space Tourist Guide; Future Human Body Designer; Agriculture Rewilding Strategist; Digital Cultural Media Commentator; Cryptocurrency Lawyers/Investment Strategist; Nano-Medicine Surgeons/Specialists: AI Avatar Designers; ‘Dismantlers’ of Legacy/Old Economy Systems; Bio-Meat Factory Engineers; Driverless “Ride Experience” Designers; Privacy Managers; Cyber Data Hostage Specialists; 3D Printer “Ink” Developers; 3D Food Printer Chef; 3D Printed Clothing Fashion Designers, Material Specialists, and Stylists; Afterlife Brain Simulation Specialists; and Genetic Super Baby Designers are just a few to name.
- ESG and UN SDG 8 Impact Investing: Decent Work and Growth:** ESG and UN SDG Impact Investing will be an important driver for the future of work and jobs. The most targeted SDG by impact investors is Goal 8: ‘Decent Work and Economic Growth’ (GIIN). Based on Refinitiv data, it is the second-most (45%) important goal that EU companies support after Goal 13, Climate Action (47%). Its significance has been bolstered by COVID, which has highlighted the role of the corporate sector in strengthening health/nutrition/quality of life. Companies with a strong record of attributes like good employer/employee relations, and policies around healthcare and leave, markedly outperformed peers.

## Robots won’t take over the world but we can’t ignore risks

- Don’t underestimate humans’ ability to one up technology...** There are areas where humans can beat machines. In the future we believe there will likely be an increasing premium for jobs within occupational groups that require social intelligence, creativity and complex problem solving as opposed to repetitive, low dexterity skills. For instance, an event planner requires more social intelligence than a dishwasher in hospitality, fashion designers require more creativity than a seamstress in apparel, and a medical surgeon requires greater perception and manipulation of tasks than a clinic receptionist within healthcare. Furthermore a recent study by McKinsey flags that ultimately it is *activities* rather than *jobs* that are being automated where US\$2tn in wages or 45% of work activities in the US could already be automated with existing technologies.
- ....but don’t disregard the risk from robots either:** COVID has hastened the adoption of technologies such as AI, chatbots, robot process automation (RPA) in white collar roles and industrial robots in blue collar jobs – all of which we estimate



could displace 2 billion jobs by 2030. Up to 47% of US jobs could be at risk over the next 20 years from computerization. And in Emerging Markets, this figure could reach 85%. Finally a recent survey of AI researchers places a 50% probability on all human tasks being automated in 45 years where there is a 50:50 likelihood of full AI (human-level AI, full breadth of human capabilities) by 2040-50E and a 90% possibility by 2075E.

- **Robot Process Automation (RPA): automating back office IT work:** The wage differential between onshore (e.g., UK/North America) and offshore (e.g., India) has narrowed from \$92k in 2005 to just c\$40k in 2019. India-based IT outsourcers appear to be planning for a 3 million/30% reduction in 'low-skilled' roles globally by 2022 because of RPA up-skilling. This represents \$100bn in reduced salary costs but, on the flipside, it offers a boon for IT services companies that successfully implement RPA – likely a >\$10bn opportunity, as well as a vibrant new software niche. Given that robots can function for 24 hours per day, this represents a significant saving of up to 10:1 vs. human labor.
- **Gig Economy: no more 9 to 5 with new platform work models:** The gig economy matters because of the changing nature of work where the 9-to-5 routine is starting to look outdated. 94% of net US job growth in the past decade was in the "alternative work category". Nearly all the 10 million jobs created between 2005 and 2015 were outside traditional 9-to-5 employment. Around 162 million or 20-30% of the working-age population in the US and EU are thought to be engaged in "independent" work and COVID has accelerated this trend. The pandemic has revealed the pros and cons of the gig economy. For example, 4 of the top Chinese digital platforms together created more than 5 million new gig jobs 1H 2020 alone. However, by creating new forms of employment, the gig economy has also muddied the legal definitions of employer/employee status. 2/3 of gig economy workers believe they should be given employment rights. As a result, regulatory disputes around sick/overtime pay, insurance, worker's rights, etc are rising. Hence we think that although the gig economy is an important short/medium jobs creator, it is unlikely to be a long term viable solution for a robust future of work where ESG/UN SDGs stress 'decent and fair work' business models.
- **Retraining/Education/Skills: the most important self-help tool(s) to stay ahead of disruption:** In a world of relentless tech disruption, we think the best way to invest in the future of work is in retraining, re-/up-skilling and lifelong learning. We believe the crux of the global disconnect between labor and technology boils down to the skills gap between what we learn at school and what we do at work. In a nutshell 20<sup>th</sup> century education practices dating back to the Victorian age have not kept up with the rapidly changing 21<sup>st</sup> century workplace. Around 100 million Europeans may need to acquire new skills this decade to transition to new jobs. Future skills will clearly be somewhat tech-focused but soft skills will be needed too. For example, Google is currently looking for employees whose top skills are "learning ability" and "leadership" with "technology content" expertise actually at the bottom of its criteria, according to the Brookings Institution. We are also not spending enough on retraining to fight off workforce skills obsolescence where >100mn workers in just 8 countries may need to switch occupations by 2030. Countries like Denmark spend over 2% of GDP on assisting and/or retraining unemployed workers, while the US spends only 0.1%. One area of retraining could be from fossil to renewables where in the US, it could cost just \$180mn to retrain 90,000 coal workers to work in solar. Lifelong learning, corporate training and development, vocational education, and massive open online courses (MOOCs) will also be critical tools to future-proofing employment prospects.

## In the long run we might have more free time

- **From future of work to future of leisure?** We may feel like we're working more in a world of non-stop work (from home), but we are actually working less. In 1870,



workers worked more than 3,000 hours annually – equivalent to a gruelling 60–70 hours each week for 50 weeks per year. But those extreme working hours have been roughly cut in half. Furthermore if automation helps free workers from mundane and repetitive tasks the future of work might tilt towards more leisure time. Just as we have labour-market policies to shape people’s working lives today, we might also need ‘leisure market policies’ to shape how people spend their spare time in a more radical future of work.

- **In the very long run Big Government may have to step in with radical measures:** This could include introducing digital/robot/wealth/tech taxes, and transitioning the social state system to a new universal basic income (UBI) system to help alleviate inequality. The OECD estimates that universal basic income (UBI) could range between US\$900 and US\$17,800 pa across countries. On tech taxes, Europe’s current proposed 3% digital tax on revenues could be a precursor. But even if these proposals are not fully approved, many countries (UK / France / Spain / Australia) could soon be proposing digital taxes independently.

## Humans > Robots: case studies of technology creating jobs

### ICT revolution actually created jobs

In theory at least, many IT analysts could well have been replaced by the rise of the Internet, which makes collecting data and information vastly more efficient, and by computers that enable rapid and complex computations. Much of their work in the 1980s, before these technologies were widespread, has since been automated. However, the opposite has happened. Computers and the Internet automated activities, such as basic mathematics and information gathering, yet the number of information analysts soared. As computers became more efficient, the cost of obtaining high-quality information dropped. Rather than decreasing demand for analysts, this stimulated the appetite for more insightful and low-cost analysis, and the number of analysts quintupled from around 400,000 in 1980 to about 2 million today. The jobs of analysts have changed as well. With information and data more easily accessible, analysts can focus on making sense of –and sharing – information rather than gathering it (source: McKinsey).

### Excel/Spreadsheets created, not ousted, more accountants

Spreadsheets, and book-keeping software, have dramatically changed the work done by accountants. But they haven’t put accountants out of work. In fact, the field has grown dramatically. In 1979, about 299,000 people worked as accountants, bookkeepers, or auditors. Intuit launched its financial software in 1983 and Microsoft Excel debuted in 1985. In 1989, just a few years after the introduction of Excel, accounting was one of the fastest-growing industries with 524,000 people employed. The field had grown 75% in 10 years. And it’s still growing. There are now about 1.28 million accountants, bookkeepers, and auditors, and that number is expected to keep growing through 2029, by about 4% a year.



**ATMs created, not removed, more retail bank branch jobs**

One might assume the ATM (automatic teller machine) ousted a lot of manual bank teller jobs. However this turns out not to be true. In 1970, the first ATM was introduced and there were about 250,000 bank tellers. By 2019, there were about 400,000 ATMs in the US and the number of bank tellers had actually doubled. This is because when ATMs were introduced, the number of tellers per bank branch fell. The average urban bank branch had 21 tellers, and with ATMs, that number fell to 13. But ATMs also made it cheaper to open a new bank branch, and the number of bank branches increased by about 40%. The net result was more bank tellers and financial advisors that helped customers address financial issues such as loans and investments (source: WEF, David Autor, MIT). And although today we are seeing another round of disruption on retail bank branches via mobile payments, the growing role of fintech could spur job creation to help offset job losses for the bank tellers of today

**Machines have their limits: premium for jobs with intelligence and creativity**

Workers should look towards tasks with skillsets that robots and computers cannot easily accomplish in the next 10-20Y. For instance, dexterity is something that current robot hardware technologies have not yet mastered. There will likely be an increasing premium for jobs that require social intelligence, creativity, and complex problem-solving.



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