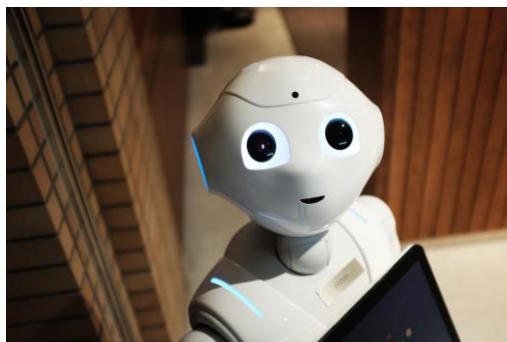


The Impacts of the Fourth Industrial Revolution on Jobs and the Future of the Third Sector

Abstract: According to a January 2016 report from the World Economic Forum (WEF), *The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*, a host of developments have moved the world of work into the “4th Industrial Revolution” which will fundamentally alter the way we live, work, and relate to one another. This paper researched the impacts of the 4th Industrial Revolution on employment and on the work of voluntary and community organisations, including identifying what new demands and opportunities these developments may present to these organisations.

Key words: the fourth Industrial Revolution; the third sector



Contents

Introduction	3
Welcome to the 4th Industrial Revolution	4-5
What Happens With Employment?	6-10
Who Loses, Who Gains?	11-14
Opportunities or Challenges for the Third Sector?	15-17
How Transforms the Third Sector?	18-19
So Much More to Discuss	20
References	21-25

Introduction

Many commentators are increasingly talking about the potential impact of the “4th Industrial Revolution.” It will change how we live and how we work, how the economy works and how we are governed. For example, a Citi and Oxford University joint report in 2016 estimated that 57% of jobs across the OECD are at risk of automation, the Financial Times reported in 2016¹ that between 2000 and 2010, of all the jobs lost in the US, over 85% were lost to new technologies, and the Bank of England estimated that two thirds of all jobs are capable of being automated within 20 years. Regardless of the specific data, an indisputable fact is that the 4th Industrial Revolution has already come, and the current workforce is already feeling the heat.

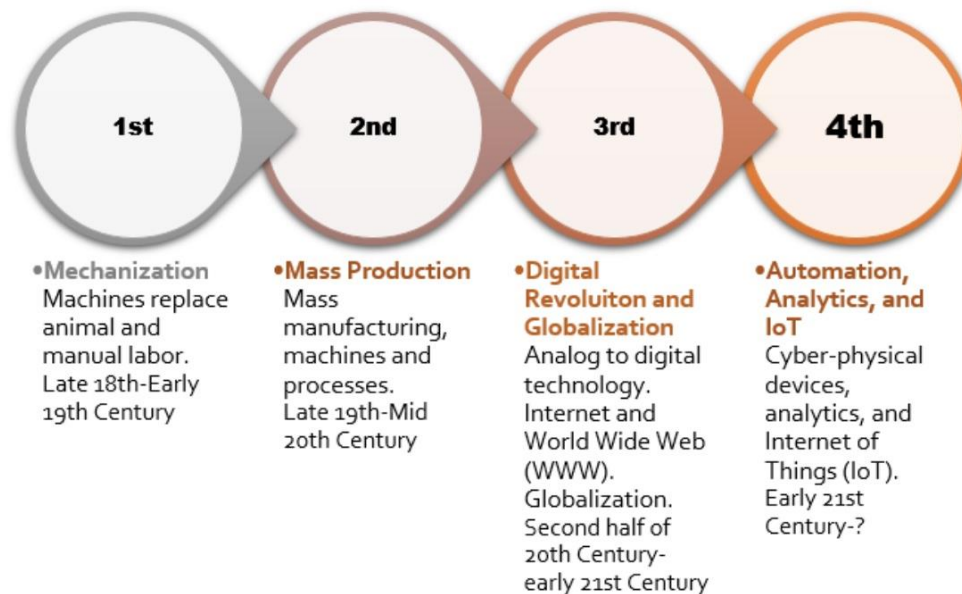
Whilst the business world is already discussing and preparing for how this revolution will affect their businesses, dubbing it “Industry 4.0”, the wider societal impacts of this new revolution have not, to date, been discussed in depth nor planned for. Past Industrial Revolutions have forced society to undergo major and often painful processes of adaptation, for example from rural, largely agricultural societies, to urban, industrial societies, and then to post-industrial societies dealing with the loss of traditional industries and sources of employment. The societal impacts of the 4th Industrial Revolution also appear likely to be far-reaching, resulting not only in the social and economic impacts of the loss of many current jobs, but also fundamental, and increasingly volatile shifts in the nature of work and future jobs, and in how public and private services will be delivered.

The Third Sector has always been at the forefront of meeting societal challenges and needs, ranging from mental health and wider health and social care services, to services for older people, to meeting transport needs in less accessible areas which private or public sector operators could not provide on a commercial or cost-effective basis. The Third Sector is therefore well-placed to play a key role in meeting the wide range of changing societal needs likely to emerge from the 4th Industrial Revolution.

¹ <https://www.ft.com/content/dec677c0-b7e6-11e6-ba85-95d1533d9a62>

Welcome to the 4th Industrial Revolution

Building on the first Industrial Revolution which used water and steam power to mechanize production, the second which used electric power to create mass production and the third, which used electronics and information technology to automate production; the 4th Industrial Revolution is taking automation to new levels, blurring the lines between the physical, digital, and biological spheres and using technologies to perform tasks previously carried out by humans, ranging from piloting vehicles to 'rules-based' jobs in areas such as accounting and law.



Source: 2025: How Will We Work? How Will Your Job Change? <https://www.td.org/insights/2025-how-will-we-work-how-will-your-job-change>

When we compare it with previous Industrial Revolutions, we find the dramatic differences between the fourth Industrial Revolution and the other three. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. The 4th Industrial Revolution is not merely a prolongation of the Third Industrial Revolution but rather a new and distinct revolution.

Firstly, people can continuously produce new information and generate new knowledge in the mining of information. The possibilities of billions of people connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge, are unlimited. We can record a person's daily life through their mobile phone location. When this data is monitored for a long period of time, we can get to know a person's lifestyle habits, such as their work place, the supermarkets they shop in, the restaurants where they dine, the times they do so, and even their personal preferences. This technology will allow the intelligence level of machines to increase through continuous data accumulation and analysis.

Secondly, the Industrial Revolution represents not only a huge advance in technology and in the improvement of productivity, but will also transform modes of production and the relationships between elements of production processes. The 4th Industrial Revolution, by enabling the complete communication of all relevant information at every stage in the production chain, creates separate production sectors for each process and informs how they relate to each other, bringing together such processes as inventory taking, improving production efficiency, saving energy and reducing emissions, thus making the manufacturing industry part of the information industry. At the same time, it can make production flexible and allow mass customization, enabling different products to be produced in a production line, which will revolutionize the warehousing, transportation and the whole manufacturing industry.

Thirdly, the 4th Industrial Revolution will spawn a new economic form, the 'sharing economy.' A typical example of sharing economy is ride-hailing online services, such as Uber and the Chinese Didi service, which allow customers to obtain taxis services from private car owners. The impact of this new form is disruptive, not only to the taxi industry, but also the whole transportation industry. (Maybe in the near future, we won't need drivers at all and unpiloted vehicles will fill the streets.) The impacts of the sharing economy are not limited to online ride-hailing services, but also include the shared space service, e.g. Airbnb, and the global online work platform, e.g. AAwork. From the shared motors and houses, to the shared umbrellas, basketballs, toys, clothing and jewelry, the sharing economy is constantly updating, and will be very profound and revolutionary.

Last but not least, as the economists Erik Brynjolfsson and Andrew McAfee have pointed out, the revolution could yield greater inequality, particularly in its potential to disrupt labor markets. With the growth of automation, robots and computers will replace workers across a vast spectrum of industries. Low-skill/low-pay jobs will disappear and the poor will face tougher challenges, which in turn will lead to an increase in social tensions. In a strict sense, this is not a unique feature of the fourth Industrial Revolution. Historically, Industrial Revolutions have always begun with greater inequality followed by periods of political and institutional change. However, mankind will face a more serious challenge in this revolution, because it is robots and computers that take our jobs, not the flow of labour between different sectors.

What Happens with Employment?

The characteristics of the fourth Industrial Revolution are destined to bring about different impacts on employment, which are no longer confined to one industry, but all industries. At the same time, a lot of jobs will disappear, but there will be a lot of new job requirements. It is expected that more than 65% of children entering primary school today will end up working in completely new jobs that currently do not exist when they enter the workplace 15 years from now. As the changes brought by the social media, digital publications and e-commerce, the most in-demand occupations did not exist 10 or even five years ago. According to *the Future of Employment* report, around 47 percent of total US employment is in the high risk category. People may be more concerned about what types of jobs are at high risk than specific Numbers. So which jobs are at greatest risk? What jobs will be safe in the future?

Researchers at Oxford University published a widely referenced study in 2013 on the likelihood of computerization for different occupations. Out of around 700 occupations, here are the top 30 most risky occupations having a 98-99 per cent chance of being automated in the future:

- 1 Telemarketers
- 2 Title Examiners, Abstractors, and Searchers
- 3 Sewers, Hand
- 4 Mathematical Technicians
- 5 Insurance Underwriters
- 6 Watch Repairers
- 7 Cargo and Freight Agents
- 8 Tax Preparers
- 9 Photographic Process Workers and Processing Machine Operators
- 10 New Accounts Clerks
- 11 Library Technicians
- 12 Data Entry Keyers
- 13 Timing Device Assemblers and Adjusters
- 14 Insurance Claims and Policy Processing Clerks
- 15 Brokerage Clerks
- 16 Order Clerks

- 17 Loan Officers
- 18 Insurance Appraisers, Auto Damage
- 19 Umpires, Referees, and Other Sports Officials
- 20 Tellers
- 21 Etchers and Engravers
- 22 Packaging and Filling Machine Operators and Tenders
- 23 Procurement Clerks
- 24 Shipping, Receiving, and Traffic Clerks
- 25 Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic
- 26 Credit Analysts
- 27 Parts Salespersons
- 28 Claims Adjusters, Examiners, and Investigators
- 29 Driver/Sales Workers
- 30 Radio Operators

On the other hand, the following list comprises the top 30 most safe occupations with a 0.66 per cent or less probability of being computerized based on current technology.

- 1 Recreational Therapists
- 2 First-Line Supervisors of Mechanics, Installers, and Repairers
- 3 Emergency Management Directors
- 4 Mental Health and Substance Abuse Social Workers
- 5 Audiologists
- 6 Occupational Therapists
- 7 Orthotists and Prosthetists
- 8 Healthcare Social Workers

- 9 Oral and Maxillofacial Surgeons
- 10 First-Line Supervisors of Fire Fighting and Prevention Workers
- 11 Dietitians and Nutritionists
- 12 Lodging Managers
- 13 Choreographers
- 14 Sales Engineers
- 15 Physicians and Surgeons
- 16 First-Line Supervisors of Transportation and Material-Moving Machine and vehicle operators
- 17 Instructional Coordinators
- 18 Psychologists, All Other
- 19 First-Line Supervisors of Police and Detectives
- 20 Dentists, General
- 21 Elementary School Teachers, Except Special Education
- 22 Medical Scientists, Except Epidemiologists
- 23 Education Administrators, Elementary and Secondary School
- 24 Podiatrists
- 25 Clinical, Counseling, and School Psychologists
- 26 Mental Health Counselors
- 27 Fabric and Apparel Patternmakers
- 28 Set and Exhibit Designers
- 29 Human Resources Managers
- 30 Recreation Workers

In another report, *the Future of Jobs*, the World Economic Forum (WEF) surveyed chief human resources officers and senior talent executives of employers who

Table 4: Employment effect of drivers of change, by job family
Compound growth rate, 2015-2020, %

Job family/Driver of change	Employment outlook	Job family/Driver of change	Employment outlook
Computer and Mathematical	3.21%	Sales and Related	0.46%
Rapid urbanization	6.11%	Processing power, Big Data	1.25%
Middle class in emerging markets	5.00%	Sharing economy, crowdsourcing	0.58%
Changing nature of work, flexible work	4.94%	Mobile internet, cloud technology	0.43%
Sharing economy, crowdsourcing	4.88%	Internet of Things	-0.89%
Processing power, Big Data	4.59%	Middle class in emerging markets	-1.14%
Internet of Things	4.54%	Consumer ethics, privacy issues	-1.28%
Geopolitical volatility	3.89%	Geopolitical volatility	-1.50%
Mobile internet, cloud technology	3.71%	Changing nature of work, flexible work	-1.51%
Consumer ethics, privacy issues	2.40%	New energy supplies and technologies	-1.58%
Architecture and Engineering	2.71%	Installation and Maintenance	-0.15%
Middle class in emerging markets	5.88%	Climate change, natural resources	3.00%
Robotics, autonomous transport	4.49%	Changing nature of work, flexible work	0.45%
Climate change, natural resources	3.68%	Mobile internet, cloud technology	-3.89%
Internet of Things	3.54%	Internet of Things	-8.00%
Adv. manufacturing, 3D printing	3.33%	Construction and Extraction	-0.93%
Changing nature of work, flexible work	3.18%	New energy supplies and technologies	1.38%
New energy supplies and technologies	2.25%	Climate change, natural resources	0.38%
Geopolitical volatility	1.33%	Geopolitical volatility	-0.07%
Management	0.97%	Changing nature of work, flexible work	-0.11%
Young demographics in emerging markets	2.14%	Arts, Design, Entertainment, Sports and Media	-1.03%
Geopolitical volatility	1.67%	Mobile internet, cloud technology	0.95%
New energy supplies and technologies	1.44%	Middle class in emerging markets	-0.83%
Processing power, Big Data	1.39%	Geopolitical volatility	-1.00%
Changing nature of work, flexible work	0.90%	Manufacturing and Production	-1.63%
Middle class in emerging markets	0.72%	Adv. materials, biotechnology	0.67%
Mobile internet, cloud technology	0.62%	Robotics, autonomous transport	-0.83%
Climate change, natural resources	0.40%	New energy supplies and technologies	-1.81%
Longevity, ageing societies	0.23%	Middle class in emerging markets	-2.16%
Business and Financial Operations	0.70%	Climate change, natural resources	-2.45%
Sharing economy, crowdsourcing	3.11%	Geopolitical volatility	-2.47%
Middle class in emerging markets	1.96%	Changing nature of work, flexible work	-2.99%
Changing nature of work, flexible work	1.88%	Longevity, ageing societies	-3.13%
Young demographics in emerging markets	1.67%	Adv. manufacturing, 3D printing	-3.60%
Geopolitical volatility	1.59%	Office and Administrative	-4.91%
Climate change, natural resources	1.39%	Changing nature of work, flexible work	-2.77%
Processing power, Big Data	1.34%	New energy supplies and technologies	-3.33%
Mobile internet, cloud technology	1.03%	Mobile internet, cloud technology	-5.82%
Consumer ethics, privacy issues	0.54%	Processing power, Big Data	-6.06%
		Consumer ethics, privacy issues	-6.18%
		Internet of Things	-6.20%
		Rapid urbanization	-6.36%
		Climate change, natural resources	-6.67%
		Geopolitical volatility	-9.72%

Source: Future of Jobs Survey, World Economic Forum.
Note: Names of drivers have been abbreviated to ensure legibility.

Source: World Economic Forum. (2016). *The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*. http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf, page 12.

WEF_Future_of_Jobs.pdf

http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf, 12

represent 15 of the world's largest economies, accounting for 65 percent of the global workforce. According to WEF, expected employment changes over the next five years vary widely by job family (or category). The table above indicates the expected impact on various job families by driver. The table shows that the category of "Office and Administrative" will see the biggest drop with 4.91%, much more than the decrease in "manufacture and production" at 1.63%. According to this survey, the main drivers of the drop in "Office and Administrative" are big data, mobile internet, cloud technology, workplace flexibility and so on. The data shows that expected declines in "Manufacturing and Production" employment also will be driven by technologies that can substitute human labour.

On the other hand, some categories show an increase on employment, such as "Computer and Mathematical" (3.21%) driven by changing nature of work, flexible work, sharing economy, big data and internet of things, and "Architecture and Engineering" fueled by the need for skilled people to run and manage new technologies like robotics, autonomous transport, new energy supplies and 3D printers.

Who Loses, Who Gains?

The 4th Industrial Revolution is creating a demand for new jobs while eliminating some of the jobs highlighted in the above reports. In the short term, mankind will face a great challenge and the jobless will soar. As the research of Erik Brynjolfsson and Andrew McAfee from the MIT Sloan School of Management, starting around 2011, technology has fueled productivity but not fueled job growth—quite the opposite, actually. McAfee and Brynjolfsson indicate that part of the reason is that our skills aren't keeping up with technological advances.

However, people should not be too pessimistic because, in the long run, the 4th Industrial Revolution will create more wealth and additional jobs elsewhere in the economy and the number of new jobs will grow dramatically. Due to the difficulties for some people to adapt to the new job requirements and master new job skills, the real problem that people are facing is structural unemployment, not lack of job opportunities.

Who loses?

Firstly, the jobs that are most at risk are those which “are on some level routine, repetitive and predictable”, as Martin Ford, futurist and author of *Rise of the Robots: Technology and the Threat of a Jobless Future* explains, because they are possible to replicate through Machine Learning algorithms.

Richard Johnston from Ulster University's Economic Policy Centre said: "Sectors like manufacturing, logistics and retail and wholesale and some of the lower skilled occupations within are the most vulnerable to being replaced by some technology or machinery or robots." For any business owner, the pursuit of profit maximization is the most important goal and reducing cost is an important factor to consider. No matter how low people's wages are they'll never be able to compete with the robots and machines, no salary, no break and no illness. Machines are better at the job: The National Institute of Standards predicts that “machine learning can improve production capacity by up to 20%” and reduce raw materials waste by 4%.

In fact, many highly routine occupations are being replaced today. Telemarketing, for example, which ranks the first according to *The Future of Employment* report, has a 99% probability of automation. The vast majority of people have received irritating robocalls. Library technicians, whose responsibilities are to compile records, sort and shelve books, remove or repair damaged books, register patrons, and check materials in and out of the circulation process, also have a 99% probability of automation. These things can be solved by existing technologies, like Amazon's fulfillment centers where people work with carefully coordinated robotic machines. Previously, Amazon workers walked around shelves looking for products, but now robotic shelves rearrange themselves to bring products to the worker. These sorting

techniques will also be used for book sorting, which will save a lot of manpower and provide additional efficiencies.

Secondly, jobs that were once regarded as secure jobs, such as office workers, administrative personnel, and even law, will be hit hardest. Future technological advances will enable people to work more flexibly, allowing people to work at home or in the office, and during working hours or off-duty hours. Employers, for their part, are also happy to choose this kind of flexible work pattern to reduce office expenses. Each employee may not need a fixed working seat, but can share working space with others. This can save thousands of pounds in furniture, office equipment and supplies, and utilities savings compared to similar workers who have fixed places in the office.

Moreover, The “Gig Economy”, a labour market characterized by the prevalence of short-term contracts or freelance work as opposed to permanent jobs, may become more and more common as part of the evolution of job flexibility. Some call this trend the “Uberization” of work, as the Future of Jobs report mentioned. Remote platforms, on which freelance or independent workers sell work to a customer, such as Upwork, Freelancer, TaskRabbit, Clarity, and 99designs facilitate the Gig Economy.

In the future, people may have several jobs for a number of companies simultaneously rather than working for one big corporation and normal full-time work seems to be in trouble.

Thirdly, jobs based on big data analysis, such as credit analysts, financial advisers, mathematical technicians, will face huge risks. The total amount of digital data in circulation was estimated to be 4.4 zettabytes² in 2013, while this number is predicted to increase tenfold to 44 zettabytes in 2020 and grow faster and faster in the future. Computers have a distinct advantage over the human brain in dealing with big data. Computers can store, access, analyze, interpret and draw meaningful inferences from big data with more accuracy and efficiency than the human brain.

The floating point arithmetic ability of the most ordinary computer can compute more than 10 billion times a second, which is far more than the computing power of the human brain. The best chess-trained computers can strategize many moves ahead, problem-solving far more deftly than can the best chess-playing humans. It is no wonder that Google’s AI beat the Go world champion.

Computers enjoy other advantages over people. Computers have better memories, so they can be fed a large amount of information, and can tap into all of it almost instantaneously. For computers, the word "oblivion" has no meaning, but for humans, no one can remember everything that happens to them. In China, a variety

² The zettabyte is a multiple of the unit byte for digital information. The prefix zetta indicates multiplication by the seventh power of 1000 or 10^{21} in the International System of Units. $1 \text{ ZB} = 1000^7 \text{ bytes} = 10^{21} \text{ bytes}$

show, 'Stand to the end', is very popular. The best player, who beats all the other people taking part must then complete with an intelligent robot to answer ten questions. Up to now, after more than 5 episodes, no one can win this robot, because it never makes a mistake.

Because of the nature of computers, jobs based on the analysis of big data can be done better by computers than of humans. Our credit ratings are based on recording all of our personal behaviors and analyzing these by computer. There is no need to meet a financial adviser face to face because we can just get the computer's advice.

Who Gains?

Firstly, jobs requiring a level of human interaction or guiding robot behavior will be very popular in the future, such as first-line supervisors of mechanics, installers, and repairers and first-line supervisors of transportation and material-moving machine and vehicle operators. These skilled people possess in-demand skills on how to run and manage new technologies like robotics, autonomous transport, new energy supplies and 3D printers. People will be working with robots and machines, not competing with them.

In the future, there may be machine trainers who teach machines to work better. Preparing the necessary data sets in advance is essential for any artificial intelligence. For instance, in medicine, they may teach robots and machines how to detect diseases with existing marker cases as demonstrations of what to look for.

Since the trend towards the development of artificial intelligence appears inevitable, artificial intelligence developers are likely to become very popular. At present, there is a huge gap in demand for artificial intelligence engineers, which directly leads to a \$345,000 annual salary for advanced AI researchers in DeepMind Technologies Limited. AI testers will test intelligent robots, spotting problems and errors, and correcting error codes especially in the early stages.

The second area is occupations that involve building complex relationships with people, especially customer-facing jobs to supply personalized services, such as sales engineers, mental health and substance abuse social workers and mental health counselors. These jobs need high interpersonal skills, teamwork and leadership, which computers cannot go beyond, such as dealing with coordination of people and communication, and divergent communications. It does not help to have a robot give people a pep talk. The clergy only has a 0.81% probability of automation, according to data from The Future of Jobs.

Aging populations will drive a dramatic increase in spending on healthcare and other personal services. By 2030, there will be at least 300 million more people aged 65 years and older than there were in 2014. This will create significant new demand for a range of occupations, including doctors, nurses, and health technicians but also

home-health aides, personal-care aides, and nursing assistants. Moreover, Health care will go from general to personal. Doctors are already using computers and other high-tech devices to improve health care. As data becomes more readily available, extensive and personalized, it will revolutionize the way doctors diagnose disease and treat patients. The online data will help doctors have access to more information on patients and link patients' wellness to their lifestyle which leads to personal services. To some extent, the treatments have to be done in thousands of ways because everyone is unique.

Thirdly, jobs that are highly unpredictable would be very difficult to be replaced by robots and machines, such as emergency management directors and repairers. They are technically difficult to automate because machines are good at repetitive tasks. The other reason is that they often command relatively lower wages, which makes automation a less attractive business proposition.

Employment of emergency management directors is projected to grow 6 percent from 2014 to 2024, about as fast as the average for all occupations, as the forecast of Bureau of Labor Statistics.

The last area is occupations on training and education. Upcoming workforce transitions could be very large. According to the Future of Employment report, around 47 percent of total US employment will disappear in the future. Meanwhile, new jobs will be available but people need to find their way into these jobs. The changes in net occupational growth or decline imply that a very large number of people may need to shift occupational categories and learn new skills in the years ahead. Many people may have to re-train several times during their working life.

Work that requires a high degree of imagination, creative analysis, and strategic thinking is harder to automate. Creativity will determine whether human beings can develop sustainably in the future, and creativity should be nurtured by education. Josefino Rivera, Jr., educator indicated education will be not just taking in information and sharing it back, but also figuring out what to do with that information in the real world.

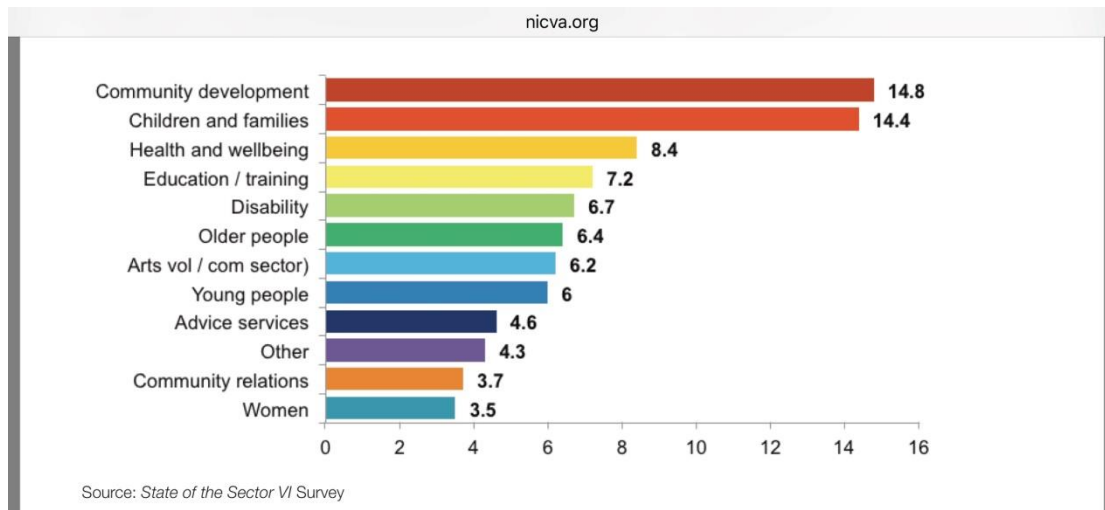
Opportunities or Challenges for the Third Sector?

The 4th Industrial Revolution is significantly different from the previous Industrial Revolutions. It will completely change everyone and every aspect of life. As Stanford University academic Jerry Kaplan writes in *Humans Need Not Apply*: today, automation is “blind to the color of your collar.” It doesn’t matter whether you’re a factory worker, a financial advisor or a professional flute-player: automation is coming for you. This applies not just to individuals but even more so to organisations and the implications for the third sector in the coming age of change is profound.

The ‘third sector’, belonging neither to the public sector nor to the private sector, covers a range of different organisations with different structures and purposes, which often is described as the charity and voluntary sector, non-governmental organisations, non-profit organisations, community sector, civil society sector and so on. This sector as a whole has evolved in scope and scale in the last hundred years. According to the 2017 report conducted by the Johns Hopkins Center on Civil Society Studies, the global civil society sector today has mushroomed into a global workforce of 350 million professionals and volunteers, “outdistancing major industries in the scale of its workforce and in its contribution to social and economic life.” Put differently, if the global civil society workforce were a country, it would be the third most populated country in the world following China and India. Moreover, every Industrial Revolution brings a lot of social changes and social problems. Typically most third sector organisations devote themselves either to a particular social issue which needs solving or to a particular group in society who requires support and representation. Many charities focus on issues surrounding social services, housing, education, human rights, community development, international development, health and medicine, and conservation and environment. From this point of view, the impact of the 4th Industrial Revolution on the third sector is definitely profound.

Is the third sector equipped to successfully navigate the challenges and opportunities of the 4th Industrial Revolution? Can they ensure the 4th Industrial Revolution advances in a manner that maximizes benefits and minimizes harms to people and the society?

The bar chart below shows the main areas of work conducted by voluntary, community and social enterprise organizations -weighted ranked scores.



It may be surprising that the main areas of work that the third sector is currently engaged in are highly coincident with the work required for the 4th Industrial Revolution. For example, occupations that involve building complex relationships with people, such as healthcare and other personal services, will increase dramatically in demand. Charities always play a significant part in health and wellbeing area, providing expert healthcare, conducting research, raising awareness, supporting patients, and promoting mental health and well-being. Health is the third largest charity sub-sector by expenditure, with 6,626 health charities spending £4bn in 2011/12. In the UK much health care is provided in the public sector by the National Health Service (NHS). However, there is also a significant provision of supplementary care by third sector bodies. Charities, compared with the public sector, are able to think more holistically, taking into account physical, emotional and environmental challenges and tackling the root causes of health inequality. Charities are at the heart of the communities they support: some directly deliver health and social care services; many work with a range of beneficiaries to provide care around daily problems. It even has the potential to allow a greater shift in focus onto the causes rather than the symptoms of problems, lessening the onset of preventable diseases and potential demand for treatment in future. These services cater to the needs of personalized medical services in the future. A similar situation exists in the work areas of disability and older people.

At the dawn of the 4th Industrial Revolution, more and more people are aware of the challenges of job losses and unemployment. Many people may have to re-train several times during their working life, which will lead to a growing demand for education and training. At present, much education is provided by the public sector. However, some independent schools and colleges are third sector bodies and some forms of education, such as private tuition, is provided on a for-profit basis. The third sector has a distinct advantage over statutory agencies in personalised education and training. Some third sector organisations are more flexible than statutory agencies in the services they provide. For example, colleges only have intakes twice

per year. This causes problems for the service users who may not be able to progress to college provision when they are ready to do so. Any “thirst for learning” that users have engendered can be lost while individuals wait until the next intake. Moreover, often working with individuals or small groups, third sector organisations are also able to tailor their learning offer in a way that public services, who generally provide for a much wider range of needs and abilities, find much more challenging. Through working with specific groups they are also able to develop in-depth knowledge of specific needs and expertise in designing services to meet those needs. In this perspective the third sector will meet the requirements of changing labor market better in the future.

How Will the Third Sector Change?

The third sector has a tremendous opportunity in the future. At the same time, the 4th Industrial Revolution will transform the third sector significantly.

Rapid Expansion

The advent of the 4th Industrial Revolution, will bring new societal problems and issues and societal problem and issues are often the focus of the work of the third sector. So, people might see more new charities and NGOs popping up to tackle social issues. As Rob Acker, CEO of Salesforce.org, predicts social good organizations can scale like never before because we're more connected than ever before. Historically, a lack of resources and funding has plagued the social sector, for example, one in five smaller charities is struggling to survive, but technology can help small organizations make a big impact. The cloud is helping to break down barriers to entry. With increased access to data, populations that were previously unreachable can now be tapped and connected with particular causes without having to drastically increase overhead costs.

Improved services

First, AI offers the potential for a more personalised service by freeing up community sector workers to do more people-oriented roles and a lot less of the grunt work. They will speak to residents, talking to customers, help the elderly, do all those compassionate, emotionally needy jobs that machines can't and shouldn't do. Second, services will become more timely, and even predictable. There's a huge opportunity for nonprofits to reach more people than ever before and connect with their donors, volunteers, students and constituents in real-time from anywhere. Nonprofits can instantly reach their community of donors and volunteers to help with urgent matters that may mean the difference between life and death. For example, a nonprofit focused on the humanitarian crisis, could identify the specific location and number of refugees coming into different countries, and preemptively send the appropriate level of aid and supplies.

Increased Income

According to the report, the State of Charities and Social Enterprises 2015, generating income and achieving financial sustainability is the most pressing challenge facing charity chief executives, and that two fifths of chief executives in large charities are concerned about a reduction in public or government funding. However, with the 4IR this problem will be solved thoroughly. Organizations can also start to organize and understand these communities better than ever before, resulting in deeper engagement. According to the recently released Connected Nonprofit Report, 65% of donors would give more money if they felt their nonprofits

knew their personal preferences—and 75% of volunteers would give more time. With deeper engagement, these organizations will start to see increases in donations and volunteer time, which directly impacts their mission.

The 4th Industrial Revolution is going to redefine what it means to be human and how we engage with one another and the planet. The third sector can use technology to find and connect with more people who need their services, understand their communities on a deeper level, and supply better services to achieve more goals. At the same time, their capabilities and potential will all evolve along with the technologies.

In the coming decades, the third sector will face both increased opportunities and challenges (e.g. an aging population) . They must recognize and seek to address future societal challenges,, particularly in the areas of social inequality and unemployment. This effort requires all stakeholders—governments, policymakers, international organizations, regulators, business organizations, academia, and civil society—to work together to steer the powerful emerging technologies in ways that limit risk and create a world that aligns with common goals for the future.

So Much More to Discuss

This report was written as an introduction to a topic that may not be on everyone's radar, and there are many questions to address:

- How should the third sector tailor its activities and services to the needs of the future, for example, to provide more personalized , or flexible education and training services to develop new and rapidly changing skills needed for the 4th Industrial Revolution?
- Which skills are going to become more important for staff in the third sector?
- What could be the role of the third sector in addressing the needs of the potentially large number of people who could become unemployed as a result of the 4th Industrial Revolution and the transition towards new ways of working
- How will we evaluate the impact the third sector is having in meeting the challenges of the 4th Industrial Revolution?
- How can the government be persuaded that they should support the third sector in particular to develop responses to the 4th Industrial Revolution?
- How should the third sector organisations cooperate with each other and with other sectors in the future in meeting the challenges of the 4th Industrial Revolution?
- How will public policy and legislation need to change to keep up?
- What new services or jobs will be created by the 4th Industrial Revolution that the third sector could provide?
- How will the 4th Industrial Revolution affect rural areas differently from urban areas?

References

1. Carl Benedikt Frey and Michael A. Osborne, The Future of Employment: How Susceptible Are Jobs to Computerization? September 17, 2013
2. The Future of Jobs Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution, World Economic Forum. January 2016
3. David Bull, Iona Joy, Sally Bagwell and Fiona Sheil, Supporting Good Health: the Role of the Charity Sector, A discussion paper & topics for future research, October 2014
4. Bridge, Brendan Murtagh and Ken O'neill, Understanding the Social Economy and the Third Sector, Palgrave Macmillan England. 44-63.
5. Li Guoping¹, HOU Yun², WU Aizhi, Fourth Industrial Revolution: Technological Drivers, Impacts and Coping Methods. Chin. Geogra. Sci. 2017 Vol. 27 No. 4 pp. 626–637
6. Artificial Intelligence: the future of the charity sector - Charity Digital News
[file:///D:/Queens/homework/placement/the%20third%20sector/Artificial%20Intel%20ligence %20the%20future%20of%20the%20charity%20sector%20-%20Charity%20Digital%20News.html](file:///D:/Queens/homework/placement/the%20third%20sector/Artificial%20Intel%20ligence%20the%20future%20of%20the%20charity%20sector%20-%20Charity%20Digital%20News.html)
7. Automation will put half of NI jobs at risk - BBC News
<http://www.bbc.co.uk/news/uk-northern-ireland-42721225>
8. Cabinet Office Advisor on Third Sector Innovation, Rt. Hon. Anne McGuire MP, The Role of Third Sector Innovation: Personalisation of Education and Learning Services, March 2010
9. Community development - Wikipedia
https://en.wikipedia.org/wiki/Community_development
10. Credit Analyst Job Description | AllAboutCareers
<https://www.allaboutcareers.com/careers/job-profile/credit-analyst>
11. Emergency Management Director Job Description, Duties and Jobs - Part 1
<https://job-descriptions.careerplanner.com/Emergency-Management-Director.cfm>
12. Five challenges for civil society in the Fourth Industrial Revolution | World Economic Forum
<file:///D:/Queens/homework/placement/the%20third%20sector/5%20challenges>

%20for%20civil%20society%20in%20the%20Fourth%20Industrial%20Revolution%
20_%20World%20Economic%20Forum.html

13. Five remarkable facts about the future of health care | Fortune
<http://fortune.com/2015/02/26/5-remarkable-facts-about-the-future-of-health-care/>
14. Five ways the Fourth Industrial Revolution will transform NGOs | World Economic Forum
<file:///D:/Queens/homework/placement/the%20third%20sector/Five%20ways%20the%20Fourth%20Industrial%20Revolution%20will%20transform%20NGOs%20%20World%20Economic%20Forum.html>
15. Future of Jobs and Employment Post Fourth Industrial Revolution | Tanmoy Ray | Pulse | LinkedIn
<file:///D:/Queens/homework/placement/the%20fourth%20industrial%20revolution/Future%20of%20Jobs%20and%20Employment%20Post%20Fourth%20Industrial%20Revolution%20%20Tanmoy%20Ray%20%20Pulse%20%20LinkedIn%E7%94%A8%E4%BA%8EPPT.html>
16. How the fourth Industrial Revolution will impact all jobs - Moneyweb
<https://www.moneyweb.co.za/news/tech/fourth-industrial-revolution-will-impact-jobs/>
17. Library Technician Job Description, Duties and Jobs - Part 1 <https://job-descriptions.careerplanner.com/Library-Technicians.cfm>
18. Math Technician: Job Description, Duties and Requirements
https://study.com/articles/Math_Technician_Job_Description_Duties_and_Requirements.html
19. Mathematical Technician Job Description, Duties and Jobs - Part 1 <https://job-descriptions.careerplanner.com/Mathematical-Technicians.cfm>
20. Mental Health and Substance Abuse Social Workers :: Job Description
<http://www.myplan.com/careers/mental-health-and-substance-abuse-social-workers/description-21-1023.00.html>
21. Medical Social Worker Job Description | JobHero
<http://www.jobhero.com/medical-social-worker-job-description/>
22. Overview of the charity sector in the UK | Prospects.ac.uk
<https://www.prospects.ac.uk/jobs-and-work-experience/job-sectors/charity-and-voluntary-work/overview-of-the-charity-sector-in-the-uk>

23. Profile | NICVA <http://www.nicva.org/stateofthesector/profile>
24. Profile | NICVA
<file:///D:/Queens/homework/placement/labour%20market%20structure/job%20types%20in%20the%20third%20sector.html>
25. Telemarketing - Wikipedia <https://en.wikipedia.org/wiki/Telemarketing>
26. The Fourth Industrial Revolution: what it means and how to respond | World Economic Forum <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>
27. The Fourth Industrial Revolution: What Happens With Employment?
<https://www.td.org/insights/the-fourth-industrial-revolution-what-happens-with-employment>
28. The fourth sector is a chance to build a new economic model for the benefit of all | World Economic Forum
<file:///D:/Queens/homework/placement/the%20third%20sector/The%20fourth%20sector%20is%20a%20chance%20to%20build%20a%20new%20economic%20model%20for%20the%20benefit%20of%20all%20%20World%20Economic%20Forum.html>
29. The robots are coming and taking our jobs | ScopeNI
file:///D:/Queens/homework/placement/the%20fourth%20industrial%20revolution/The%20robots%20are%20coming%20and%20taking%20our%20jobs%20_%20ScopeNI.html
30. The Future of Human Work Is Imagination, Creativity, and Strategy
<https://hbr.org/2018/01/the-future-of-human-work-is-imagination-creativity-and-strategy>
31. What the future of work will mean for jobs, skills, and wages: Jobs lost, jobs gained | McKinsey & Company <https://www.mckinsey.com/global-themes/future-of-organizations-and-work/what-the-future-of-work-will-mean-for-jobs-skills-and-wages>
32. What is civil society? | NCVO UK Civil Society Almanac
<https://data.ncvo.org.uk/a/almanac16/what-is-civil-society-3/>
33. Understand the Impact of the Fourth Industrial Revolution on Society
<file:///D:/Queens/homework/placement/the%20third%20sector/Understand%20the%20Impact%20of%20the%20Fourth%20Industrial%20Revolution%20on%20Society.html>

34. What is Community Development? <http://www.scdc.org.uk/who/what-is-community-development/>
35. What is the third sector and what does it do?; Public policy engagement toolkit; Newcastle University
<http://toolkit.northernbridge.ac.uk/engagingwithpolicymakers/engagingwiththethirdsector/whatisthethirdsectorandwhatdoesitdo/>
36. What jobs will still be around in 20 years? Read this to prepare your future | US news | The Guardian
<file:///D:/Queens/homework/placement/the%20fourth%20industrial%20revolution/What%20jobs%20will%20still%20be%20around%20in%2020%20years%20Read%20this%20to%20prepare%20your%20future%20%20US%20news%20%20The%20Guardian.html>
37. Why Everyone Must Get Ready For The 4th Industrial Revolution
<https://www.forbes.com/sites/bernardmarr/2016/04/05/why-everyone-must-get-ready-for-4th-industrial-revolution/2/>
38. 2025: How Will We Work? How Will Your Job Change?
<file:///D:/Queens/homework/placement/the%20fourth%20industrial%20revolution/2025%20How%20Will%20We%20Work%20How%20Will%20Your%20Job%20Change%20%E7%94%A8%E4%BA%8EPPT.html>
39. 第四次工业革命将怎样改变世界? -新华网
http://www.xinhuanet.com/world/2016-03/17/c_128806846.htm
40. 人工智能技术逐渐兴起 2020 年会出现这六种新工作-机器人社区
<file:///D:/Queens/homework/placement/the%20fourth%20industrial%20revolution/%E4%BA%BA%E5%B7%A5%E6%99%BA%E8%83%BD%E6%8A%80%E6%9C%AF%E9%80%90%E6%B8%90%E5%85%B4%E8%B5%B7%202020%E5%B9%B4%E4%BC%9A%E5%87%BA%E7%8E%B0%E8%BF%99%E5%85%AD%E7%A7%8D%E6%96%B0%E5%B7%A5%E4%BD%9C-%E6%9C%BA%E5%99%A8%E4%BA%BA%E7%A4%BE%E5%8C%BA.html>
41. 美媒：第四次工业革命来临？人工智能将消灭过时岗位_《参考消息》官方网站 <http://www.cankaoxiaoxi.com/finance/20171124/2244691.shtml>
42. 第四次工业革命在即 中国将被无人经济这样改变_搜狐财经_搜狐网
http://www.sohu.com/a/215319819_819027
43. 第四次工业革命如何 改变未来就业趋势? _网易财经
<http://money.163.com/16/0621/04/BQ2DVBK000253B0H.html>

44. 科技如同双刃剑：深度解读第四次工业革命利与弊_网易科技
<http://tech.163.com/16/1031/07/C4MKEF6I00097U80.html>
45. 第四次工业革命来临，哪 20 种工作最容易失业？_文化_腾讯网
<http://cul.qq.com/a/20160610/018134.htm>
46. 共享经济_360 百科 <https://baike.so.com/doc/3760764-3950750.html>