MiGHT
Malaysian Industry-Government Group for High Technology

myForesight®

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FUTURE OF WORK

Global Innovation Summit 2017

The sustainable future of production, consumption and work

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Hosted by

GFCC Global Federation of Competitiveness Councils

MiGHT Malaysian Industry-Government Group for High Technology

Strategic Partners

TENAGA NASIONAL Better Brighter · UEM · SIRIM · KORIDOR UTARA MALAYSIA

Snapshots of Malaysia's Performance in The Global Competitiveness Report 2017-2018

OVERALL

MALAYSIA RANKS

23RD OUT OF 137 ECONOMIES

2ND

MALAYSIA'S RANK IN ASEAN

9TH

MALAYSIA'S RANK IN ASIA PASIFIC

Source: MPC | GLOBAL COMPETITIVENESS REPORT 2017-2018

For more info visit gis2017.thegfcc.org

What exactly is economic competitiveness?

..."the set of institutions, policies and factors that determine the level of productivity of a country"...

The World Economic Forum (WEF)

..."The degree to which the region (nation) can produce goods and services which meet the test of international markets, out-performing others, while its citizens earn a standard of living that is both rising and sustainable over the long-run"...

The Malaysia Productivity Corporation (MPC)

IN 60 YEARS OF INDEPENDENCE

- Malaysia's GDP has increased more than a hundredfold. Over the past four decades, we have averaged nearly 7% annual growth.
- Poverty rates have fallen from 49% to less than 1%.
- Per-capita GDP has risen from US$370 to more than US$9,000

HOUSEHOLD INCOME FOR MALAYSIANS

2014 RM4,585

2016 RM5,228

improved 6.6%

2/2017

inside myForesight®

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Malaysian Industry-Government Group for High Technology (320059-P)
MIGHT Partnership Hub, Impact Building, Jalan Impact, 63000 Cyberjaya, Selangor, Malaysia.

www.might.org.my

FOR INQUIRIES
myForesight®

Phone : +603 8315 7888
E-mail : foresight@might.org.my
Website : www.myforesight.my

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myForesight® is a pioneering national level initiative dedicated to the prospecting of technology for business through the field of Foresight. It provides a common Malaysian based platform for the Government, Industry and Academia to share experiences, insights and expertise on the strategic futures issues, both at the local and global levels.

Its key components to its mission are intelligence, research, competency and community. **myForesight®** raison d'etre is to accomplish the following:

1. Shaping Malaysia's future possibilities;
2. Promoting and mainstreaming of foresighting in national, sectoral and corporate planning;
3. Identification of key technologies to support sectoral development;
4. Identification of key and potential industries from technology perspective.

EDITOR'S NOTE

Initial Thoughts

RUSHDI ABDUL RAHIM
rushdi@might.org.my

> *It is estimated that approximately 500 million new jobs need to be created by 2020 to provide opportunities to those currently unemployed, not to mention consideration for the youth projected to join the workforce over the next few years.*

Greetings and Salutations!

In the parlance of our times, each mention of the phrase 'Future of Work' conjures up images of robots with artificial intelligence taking up jobs that were previously completed by humans. We imagine human beings armed with a high level of technical knowledge working with these intelligent robots in pristine looking offices full of digital displays and computer readings. These are the scenes we normally see in movies. In reality,, the future of work poses considerable challenges.

According to the International Labour Organization, more than 61 million jobs have been lost since 2008, leaving more than 200 million people unemployed globally. It is estimated that approximately 500 million new jobs need to be created by 2020 to provide opportunities to those currently unemployed, not to mention consideration for the youth projected to join the workforce over the next few years. Herein lies a challenge—many industries are currently facing difficulty in hiring qualified staff. One survey found that, globally, 38 percent of all employers are reporting difficulty in filling current job vacancies.

Here at myForesight® & MIGHT, we have been looking at this topic over the past 12 months. During the last Malaysia's National Science Council meeting chaired by the Prime Minister, we were given the opportunity to present salient points of our findings, specifically on the topic of "Future of Work – The changing nature of work, workforce & workplace."

> *The rate of technological development and its convergence are changing industries at a rapid pace. Therefore, the future of work is undergoing massive changes—the type and nature of work, the requirement of its workforce, as well as the changing form of workplaces.*

During the meeting, we highlighted the impact trends of globalisation, technological progress and demographic change are having on the numbers and nature of work that are available, as well as potentially how and who will be undertaking them. These trends affecting the future of work not only offer opportunities, but also bring with them significant challenges and associated risks.

The rate of technological development and its convergence are changing industries at a rapid pace. Therefore, the future of work is undergoing massive changes—the type and nature of work, the requirement of its workforce, as well as the changing form of workplaces. Managing this transition will be a challenge, since it involves preparing for a future beyond the expected increase of automation.

We acknowledge the difficulty in facing policymakers in planning the details for the potential changes that might affect the world of work in years to come. What is most apparent during the presentation and the discussion that followed was the need, due to advances in technology and the 4th Industrial Revolution, for a systemic change in education and training.

The mutual feeling is that prospective employers need to collaborate with schools and universities on the development of curriculum, and to readily share knowledge concerning demands of the job market. The education system also needs to incorporate the change necessary to allow a focus on lifelong learning. While there has been impressive progress in improving access to education and its quality, the relevance of learning has rarely been improved on any notable scale. Continuous review of education and workforce policies are needed to make them more reactive and relevant to the ever-changing market requirements.

However, it is not all doom and gloom. We believe the advances in technology could also give a huge boost and create jobs. This will depend on the ambitions and drive of Malaysia's industries in embracing the 4th Industrial Revolution.

We offer some great reads in this publication to stimulate your thinking regarding the changes already happening or about to happen in your workplace. We hope you'll find this magazine thought provoking, and we welcome commentaries, suggestions and contributions of ideas.

RUSHDI ABDUL RAHIM

IN PERSON WITH

Professor Tan Sri
Zakri Abdul Hamid

Tan Sri Datuk Dr. Ir.
Ahmad Tajuddin Ali FASc

CONVERSATION WITH

Joint Chairs of **MIGHT**

The acceleration of connectivity and cognitive technology is changing the fundamental nature of work. As AI systems, robotics, and cognitive tools grow in sophistication, almost every job is being reinvented and the nature of work is changing. As this trend gathers speed, organisations must reconsider how they design jobs, organise work, and plan for future growth. Understanding these shifts will help policy makers, business leaders, and workers move towards the future.

At the core of Malaysian Industry-Government Group for High Technology (MIGHT), is the spirit to foster collaborative engagement between **Government** and **Industry** in moving our nation's high technology industry forward. It is in this spirit of cooperation that MIGHT has two leading personalities representing each group steering its course as **Joint Chairs of MIGHT** — Professor Tan Sri Zakri Abdul Hamid, the Science Advisor to the Prime Minister of Malaysia and Tan Sri Datuk Dr Ir. Ahmad Tajuddin Ali, FASc, an industry leader with an illustrious *vitae* to his name.

Together, with their combined wisdom and experience, and earnest hope for a prosperous nation on all fronts, we seek to gain their insights in charting our way forward. Read the full interview and hear their thoughts on how we can navigate through the future uncertainties.

Q1: The Changing Nature of Work

Changes in the nature of work are quite normal given the technological advances that we experience as a result of new scientific discoveries and innovation. The changes in the past have been quite linear and are mainly confined within their own sectoral confines, be it digital, physical or biological.

But what is happening today, in my opinion, is more fascinating than alarming due to the speed, the velocity, depth and breadth of this technological transformation. Endless possibilities are created across the physical, biological and digital worlds through the emergence of AI, robotics, autonomous vehicles, biotechnology, nanotechnology and 3-D prinitng.

It is speculated that the transformation will change the way we live, work and relate to one another, thus it is pertinent for the government, private sector, academia and civil society to come together and face these new challenges.

> *"But what is happening today, in my opinion, is more fascinating than alarming due to the speed, the velocity, depth and breadth of this technological transformation."*
>
> Prof. Tan Sri Zakri Abdul Hamid

The 4th Industrial Revolution or often referred to as Industry 4.0 brings technologies that would disrupt and challenge the traditional business model which has existed in the past regardless of sectors and areas. There are great opportunities as well as tremendous risks within this transformation, and there will be no industry or organisation that will not be impacted in some way, which means, almost every business sector could no longer afford to operate 'business as usual'.

Let's talk about 3D printing, a technology that is capable of producing complex products and eliminates the need for a large scale assembly line, decentralising production to the level of individual components. This allows for better personalisation and customisation of goods introducing the possibility that some jobs could be completed at home instead of the work place or the factory. This will affect the demand for a large number of assembly line workers and perhaps we will see a future where everybody, even smaller organisations, could become a producers of goods.

Further disruption is also brought about by advancement in artificial intelligence (AI) especially now where machine learning is combined with big data analytics. This scenario expands machine capabilities beyond routine and mundane tasks. Machines will be able to learn by themselves with continuous data feed, and perform any tasks with a high degree of precision.

Even professional jobs such as doctors, lawyers and accountants, are now at risk of automation. However I am not saying all these professions will become extinct, but these jobs as we know them will definitely change.

> *"Further disruption is also brought about by advancement in artificial intelligence (AI) especially now where machine learning is combined with big data analytics."*
>
> Tan Sri Datuk Dr. Ir. Ahmad Tajuddin Ali, FASc

Q2: Why Does Disruption Matters

Since our independence 60 years ago, it has always been our aspiration to be a progressive nation. From an economy dominated by the production of raw natural resources such as tin and rubber, Malaysia today has a diversified economy and is a leading exporter of electrical appliances, electronic parts and components and natural gas. According to the World Bank, less than 1percent of Malaysian households live in extreme poverty.

Our progress is also predicated on an educated and skilled workforce. We know knowledge is the currency of the future. Automation and robots will replace current jobs. We need to be dexterous and agile in our thinking so that we can adapt to the fast changing scenarios. Our education system needs to be re-calibrated so that elements of critical thinking are highly factored in.

As emphasised by the Prime Minister during one of the meetings of his Global Science and Innovation Advisory Council (GSIAC), our challenge is "*to prepare young Malaysians for jobs that do not yet exist today. The key is to liberate their minds. It's not what they learn but how they learn that matters.*"

In a speech at Harvard University in September 1943, British Prime Minister Sir Winston Churchill declared that the "*Empires of the Future are the Empires of the Mind.*" How true this prediction turned out to be. Today, countries devoid of natural resources such as Japan, South Korea and Germany could be counted as economic powerhouses mainly due to their innovative and highly-skilled labour force.

> *We know knowledge is the currency of the future. Automation and robots will replace current jobs. We need to be dexterous and agile in our thinking so that we can adapt to the fast changing scenarios.*
>
> Prof. Tan Sri Zakri Abdul Hamid

I believe it is about systemic change and the impact is not limited to geographical location. We've seen how it affects the manufacturing sector in countries such as China and Germany. Thousands of workers were affected due to the deployment of robots.

In Malaysia, the manufacturing sector is still the highest contributor to the country's economy. If such scenario were to happen here, it would affect more than 1 million workers in the sector.

Even the service sector is not immune to this phenomenon. We have already witnessed the impact of sharing economy enabled by digital platform and Internet of Things disrupting existing business and business model. UBER and Grab disrupting the Taxi Service is just the beginning.

Businesses providing intermediaries service, manual service, low value added activities among the examples could be displaced by new business that leveraging on digital based platforms. The likes of travel agents for example have already feel the impact of this. Majority of people are booking tickets online and making hotel arrangements via digital platform.

> *In Malaysia, the manufacturing sector is still the highest contributor to the country's economy. If such scenario were to happen here, it would affect more than 1 million workers in the sector.*
>
> Tan Sri Datuk Dr. Ir. Ahmad Tajuddin Ali, FASc

Q3: Navigating Through the Challenges

These challenges should be faced as a collective responsibility involving government, industry, academia and civil society.

Indeed the government has started incorporating the relevant elements of concern in its five-year development plans. For the 11th Malaysia Plan (2015-2020), there are references to smart manufacturing, additive manufacturing, robotics, Internet of Things and Big Data Analytics. The mastery of Science, Technology, Engineering and Mathematics (STEM) is being given utmost attention.

During the launch of 2050 National Transformation Plan (TN50) earlier this year, the Prime Minister, introduced a Roadmap for the country to be a progressive and prosperous nation based on a knowledge-based economy.

The government, as an enabler for Industry 4.0, not only will come up with the National Policy but also need to undertake the following course of actions: i) improve infrastructure and ecosystem; ii) provide targeted funding and incentives particularly for SMEs; iii) ensure adequate supply of human capital and skills; iv) facilitate development of standards and technology supply, and v) increase overall awareness on Industry 4.0.

"The process has just began. It is up to us, especially the younger generation, to fill in the blanks and connect the dots."

Prof. Tan Sri Zakri Abdul Hamid

The future that we talk about today will arrive sooner than we think. The nature of works will continue to change dynamically and the question is "*Whether our education could keep pace?*" The challenge is providing the right talent for industry needs.

I see there will be greater emphasis on STEM based talents, but there also a greater need for job skills that are exclusively human centric in nature. Communication, creativity, empathy, to name a few. Things that robots can't do… yet.

The future will be driven by convergence of technologies and it is critical for the country to address digital divide and achieve 100 percent digital inclusiveness. This will allow equal opportunities for all Malaysian to have access to the same information, people, education, potential business and jobs.

Business enterprises will need to understand and be aware of the potential disruptiveness and risk—How will it impact their businesses? A survey conducted by the Federation of Malaysian Manufacturers found that more than 55 percent of SMEs are not ready for Industry 4.0. That gives an indication of our future preparedness.

"It is not all doom and gloom. I see opportunities for Malaysia to take advantage of these phenomenon. We need to be innovative and agile, taking advantage of this disruption to create new opportunities."

Tan Sri Datuk Dr. Ir. Ahmad Tajuddin Ali, FASc

by | Mohd Nurul Azammi Mohd Nudri
azammi@might.org.my

Trends & Challenges Shaping the Future of Work

Emerging technology always leads to new jobs. Positions such as App Developer, Social Media Manager, Ride-sharing Drivers, Autonomous Cars Engineer, Bot Developer, Big Data Analyst/ Data Scientist, Youtube Content Creator, Drone Operator and Millennial Generational Expert are among jobs that were considered experimental in previous years are now indispensable. According to the World Economic Forum (WEF), the Digital Age is creating many new jobs position that were unheard of 10 years ago.

WEF also suggests that 65 percent of children entering primary school today will ultimately end up making a living off an occupation that does not yet exist. With such an expansion in technology, hundreds of new roles that were unheard of a decade ago are created and will continuously evolve for the next 10 to 20 years.

Although the picture is vague on how these trends will intersect and unfold to create future scenarios, it is imperative that we fully understand these trends to encourage a more proactive role in anticipating future challenges especially by the policy makers, industry leaders, community heads, academia, non-governmental organisations and other stakeholders.

TOP TEN TRENDS

Trends

Here are the top ten trends that are making an impact in shaping the future of work.

TREND 1: Aging World

An aging nation as defined by the United Nations is a country with 14 percent of its population aged 65 and above. In 2017, several nations were recognised to have highest number of aging populations such as Japan, Germany, Italy, Greece, and Bulgaria—each holding a record of more than 18 percent. Between 2015 and 2030, the number of people in the world aged 60 years and above is estimated to grow by 56 percent. Although Malaysia's aging population is low, it is projected that by year 2040, 14.5 percent of the population will be senior citizens.

This trend is driven by many factors including;

1. **Declining birth rates** in nearly all regions of the world. Total fertility counts in countries such as Africa, with the highest birth rate in the world, has fallen from 5.1 births per woman in 2000-2005 to 4.7 in 2010-2015. Malaysia is also experiencing slow growth with the annual population rate decreasing from 1.8 percent in 2010 to an estimated 0.8 percent in 2040. On average, the population growth rate in Malaysia is decreasing by 0.05 percent each year.

2. **Increasing life expectancy** has shown an upward trend globally (65 years for male and 69 years for female in 2000-2005 to 69 years for male and 73 years for female in 2010-2015). Advancements in public health and medical technologies, along with improvements in living conditions have made this possible. In Malaysia, a study highlighted that the median age of Malaysians in 2010 was 26.3 years and is projected to rise to 38.3 years in 2040, an increase of 12 years over the period of 30 years.

Countries need to identify and formulate the right mechanism to be able to tap into this pool of aging communities in the workforce. For example, the Japanese government has decided to raise the official age of retirement to age 65 by 2025 to reduce pressure on a shrinking tax base and rising social welfare bill. Unemployment has dropped to its lowest in two decades in Japan, in part because so many of the country's elderly are still working. Companies such as Suntory Holdings and Aeon Co Ltd are already leading the way in managing Japan's aging population. Another Korean start-up company, EverYoung, is hiring only employees that are over 55 years old.

TREND 2: Women Empowerment

Gender inequalities in the labour market continues to be discussed in global agendas especially in pursuing the 2030 Sustainable Development Goals (SDGs). According to International Labour Organization (ILO), the chances for women to participate in the labour market remain almost 27 percent lower than for men worldwide.

Nevertheless, the participation of women in the workforce is on the rise. In some countries, gaps have narrowed and women are shifting away from contributing family work and moving to the services sector. Substantially more than half of the world's women are employed in the service sector—since 1995, women's employment has increased from 41.1 percent to 61.5 percent. McKinsey Global Institute forecasted that if women participated in the economy at a level identical to that of men, it would add up to US$ 28 trillion or 26 percent of annual global gross domestic product (GDP) in 2025, assuming a business-as-usual scenario. This impact is roughly equivalent to the size of the combined United States and Chinese economies today.

This increasing trend is also demonstrated by labour participation rate in Malaysia. A Government agency, Talent Corp reported that female labour participation rate (FLPR) climbed to 54.1 percent in 2015 from 46.8 percent in 2010. As much as 7.3 percent increase in FLPR has resulted in an additional 750,000 women entering the workforce. This is estimated to have contributed an additional 0.3 percentage points to GDP growth per annum.

TREND 3:
Digital Natives

U.S. author Marc Prensky in 2001 coins the term *digital natives* to describe a person that grows-up in the digital age. The term **digital native** doesn't refer to a particular generation but instead, is a catch-all category for children who have grown up using technology like the Internet, computers and mobile devices. Their preference and notion about careers and workplace are different from previous generations—therefore it is crucial for employers to transform with time to attract future talents. For example, unlike previous generations which were structured in rigid hierarchical management with policies and procedures, the *millennial* and *digital natives* are inclined towards more flexibility, autonomy, access to real-time learning, a sense of stability, and the ability to pursue projects that are personally meaningful.

In Malaysia, the younger workforce can be divided into two (2) cohorts; First cohort, known as Gen-Y are born during the 1980's difficult economic circumstances and political upheavals of the past. They learned that the world is uncertain and as a result they actively try to minimise risk and maximise opportunity for themselves—these values are demonstrated a variety ways; through their work, lifestyle and buying habits.

While the second cohort, born in the 1990's were not so impacted by difficult times and are much more influenced by the opportunities of a promising future, particularly due to the rapid development of digital technology and globalisation. They are more willing to take on potentially risky challenges and less likely to create distinctions between their professional and personal lives.

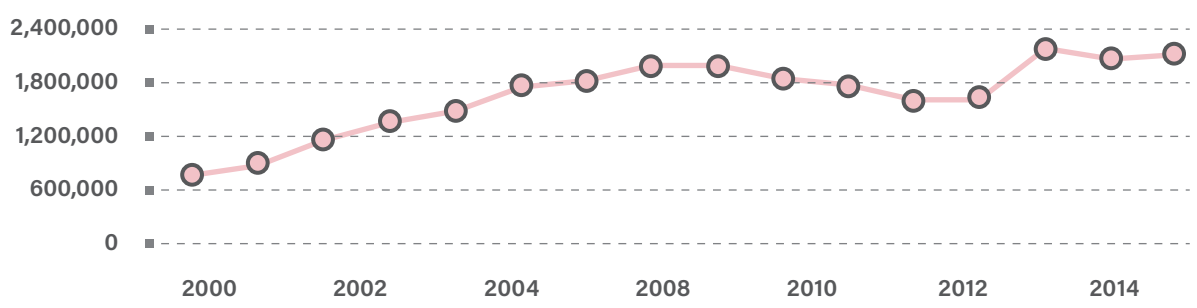
TREND 4:
Migration and Cultural Diversity

Global migration has increased incredibly in the past few decades due to several factors such as geo-political, social preference, economic opportunities and climate change. The number of immigrants recorded by UNHCR now is three times higher than in 1960. Currently, 3.3 percent of the world's population is not living in their birth country. Although migration seems advantageous in providing a supply of job talents, it may also cause friction from cultural point of view.

Similar increasing trend can be seen in Malaysia as shown by the statistic from Economic Planning Unit (EPU) since 2000 to 2015 **(Figure 1)**. Between the year 2014 to 2015, 2.6 percent of population in Malaysia are migrants with 88.4 percent internal migrants and 11.6 percent international migrants. Malaysia needs international talent and investments for economic growth and sustainability, which results into an expanded and more diverse multi-racial society.

> *"The millennial and digital natives are inclined towards more flexibility, autonomy, access to real-time learning, a sense of stability, and the ability to pursue projects that are personally meaningful."*

NUMBERS OF FOREIGN WORKERS IN MALAYSIA



Source: Economic Planning Unit (EPU)

Figure 1: *Numbers of Foreign Workers in Malaysia*

TREND 5: Urbanisation

The share of the world's population living in cities now stands at 3.7 billion people and this number is expected to double by 2050—with two of every three people will be living in a city. According to the World Bank, this trend of urbanisation will likely continue and by 2030, all urbanisation will occur in the developing world. This global shift toward a more urban global population has profound implications for a wide range of issues especially job talents.

The UN has defined a mega-city as having a population of at least 10 million people. The number of mega-cities has grown from 10 in 1990 to 31 in 2016, and another 10 cities are projected to reach mega-city status by 2030. The largest city in the world is currently Tokyo, Japan, home to approximately 38,140,000 residents. Malaysia is also facing rapid urbanisation at the rate of 1 per cent every year according to the Department of Statistic.

There are several common factors prompting this global phenomenon according to the Grayline Group. One prominent factor, the advancement of agricultural methods and machinery, is decreasing the number of workers required to sustain agricultural production. Another factor is the nature of modern economies, specifically the increasing concentration of wealth creation and the specialised nature of modern workforces. The steady flow of migrants congregating in a city will escalate and as city life becomes a reality for an ever-greater share of the world's population, governments, companies, civil society must recognise the growing needs for energy, houses, transport, food, water, sanitation care and education.

TREND 6: Blurring Boundaries of Traditional Sector

Job demarcation that was so previously defined is now converging between industries and sectors. The exponential growth of technologies is exposing a new set of jobs to the possibility of automation and occurs in three (3) major perspectives namely *human and machine boundary, producer and consumer boundary* and *physical and digital boundary* (Blurring boundaries, uncharted frontier, Deloitte).

In a future where the world is ruled by automation and artificial intelligence, jobs can be copied by technology and machines can replace humans. Technology has also made it possible for some routine cognitive jobs to be done in other parts of the world where labor costs are lower, for example offshore call centers and back-office functions. Application of AI such as machine learning where automation or robots are able to perform self-learning through feeding of relevant data, enhances precision of undertaking a particular task. Other types of application are knowledge representation and reasoning and machine to machine (M2M) communication, to name a few.

The blurring of producer and consumer boundary is a consequence of the consumers' shift from passive to active in production of tangible and intangible products. For intangible products in a sharing economy, the production of valuable data can be shared across the world through social media and other types of online platforms such as blog and YouTube. While tangible products ranges from simple designs such as cutlery, toys, prosthetic parts, to complex items such as weapons, buildings or cars can be produced using 3D printing machine.

When this scenario occurs, production is going to be decentralised from a giant manufacturing level to a smaller scale, and may create job opportunities that can be performed even from home.

> *"The advancement of technologies created during the third industry revolution and expanding to the fourth industrial revolution resulted in converging of industries and sectors, reducing the clear lines of demarcation which previously defined and codified almost 80 years ago."*

The blurring of physical and digital boundaries occurs when both worlds are getting to look more alike. This is driven by the increasing pace and scope of Internet computing, artificial intelligence, and big data to create seamless consumer experiences. Using smartphones and other digital devices, consumers are able to do everything from shopping to dating. As one example, Alexa personifies the Amazon brand, a cloud-based digital assistant driven by artificial intelligence and natural language capable of voice interaction, music playback, making to-do lists, setting alarms, streaming podcasts, playing audiobooks, and providing weather, traffic, and other real time information. Next, Google and Facebook will further enhance consumer's experience with augmented and virtual reality technologies such as Google glass and Oculus, respectively.

TREND 7: Hyper-Connectivity

Hyper-connectivity is a world where people, information, and objects around us are connected via global networks. The industry revolution brings technologies that enable communication between person-to-person, person to machine and machine-to-machine (M2M) through computing technologies. By 2030, SAP projected that there will be 50 billion connected devices in the internet of things (IoT). **(Figure 2)**

Advancing future connectivity, billions dollar worth of investments on the idea to beam internet service around the world (known as space internet) is already drawn

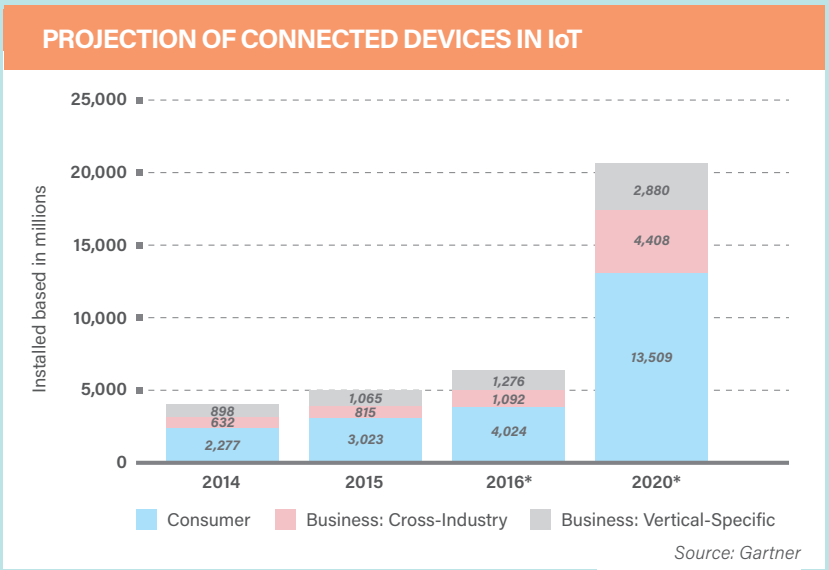


Figure 2: *Internet of Things units installed base worldwide by category from 2014 - 2016 and in 220 (in millions units)*

up by renowned companies such as Facebook, SpaceX, Google (Project Loon), Qualcomm and Virgin (OneWeb). Everyone on Earth can access the Internet without building an untenable amount of infrastructure. These initiatives will expand digital inclusiveness of people, especially in providing equal opportunities for rural areas to have the same access to information, people and others now available to people in urban areas.

Malaysia is one of the developed nations with the highest technology readiness ranking according to world competitiveness index. Moving towards 2025, in preparing for the trend, the National IoT Strategic Roadmap formulated in 2015 has set three (3) major goals namely; to create a conducive IoT industry eco-system, to strengthen technopreneur capabilities in Apps and Service layer, and to turn Malaysia into a regional development hub for IoT. Therefore, several targets are to be achieved such as mobile and device penetration from 147 percent to 280 percent, growing internet users from 65.8 percent to 195 percent, mobile broadband penetration from 13.3 percent in 2015 to 167 percent in 2025 and social network penetration from 45 percent to 135 percent.

Hyper connectivity is shaping the future form of jobs and skills. As an example, more connected objects will mean more data will be produced. Big data is doubling every 18 months and the amount of data are growing 50 times from 2010 to 2020. In view of this, analysis work needed to make sense of huge amount of data as well as to provide new-never-encountered insights will become a job that is sought after in the future. Hyper-connectivity makes distance, time and space immaterial. People don't have to be in the same room, or even in the same country for them to have face-to-face contact and this could certainly produce a new form of workplace. The use of digital collaborative platforms will provide significant savings in time, cost and enable flexibility of a company to tap on talent globally.

TREND 8:
Globalisation & Decentralisation

Globalisation will continue to stay driven by factors such as improved communication, improved transportation and logistics, free trade agreements, global banking and the growth of Multinational Corporation (MNCs). Even more pronounced impact of the trend can be noted with the advancement of technologies such as social computing, digital platforms, internet of things and Blockchain.

While globalisation continues, the economic trend is moving from centralisation to decentralisation. Decentralisation is the process of redistributing or dispersing functions, powers, people or things away from a central location or authority. The traditional model, which runs on centralised activities, will no longer be competitive and sustainable as the world economic system moves towards collaboration between individuals and the sharing of resources. A popular example of this trend is Uber, the world's largest taxi company, who owns no vehicles. Facebook, the world's most popular media owner, creates no content. Alibaba, the most valuable retailer, has no inventory. And Airbnb, the world's largest accommodation provider, owns no real estate.

More examples of decentralisation are happening in the financial system with emergence of a technology platform called Blockchain. It is a shared database of transactions among parties designed to increase security, transparency, and efficiency (Goldman Sachs). The invention and use of Bitcoin as a cryptocurrency eliminates the need for a centralised server or a trusted authority. In energy sector, advancement of solar and wind technology, high capacity battery, smart and micro-grid couple with Blockchain technology will cause a shift in power producing from a large corporation to the level of an individual house as demonstrated by a community in Brooklyn, New York. The community demonstrated a peer-to-peer energy sales network based on blockchain technology whereby homes with rooftop solar power can sell to their neighbors on the same street who do not have solar power installed. Last but not the least, Youtube, Instagram and other tools on the Internet are empowering the ordinary aspiring citizen to create content, make his own channel on Youtube and become a star—basically, anyone with an internet connection can become the world's most watched YouTuber without the help of big media houses if they produce quality content.

TREND 9:
Rise of Machines

Automation has been around for decades and existed with the purpose to save manual labour, increase productivity and create high value jobs. In the past, automation is highly structured in predictable environments and limited to collection and processing of data. The new age of automation where advancement of technology especially in artificial intelligence, internet of things, machine learning and big data among others have further enhanced the capabilities of machine to perform beyond non-cognitive and routine tasks. Machines which are known to perform assembly of parts in production line of a factory are slowly replacing jobs that are currently performed by humans—not limited to factory workers but including professionals such as doctors, lawyers, accountants, truck drivers, police, builders, cooks, journalists, composers and surgeons.

Recently, Russian President Vladimir Putin stated that whoever reaches a breakthrough in developing artificial intelligence will dominate the world (ABC News). This is reflected by the increasing trends of financing start-ups reaching high in 2016 growing from

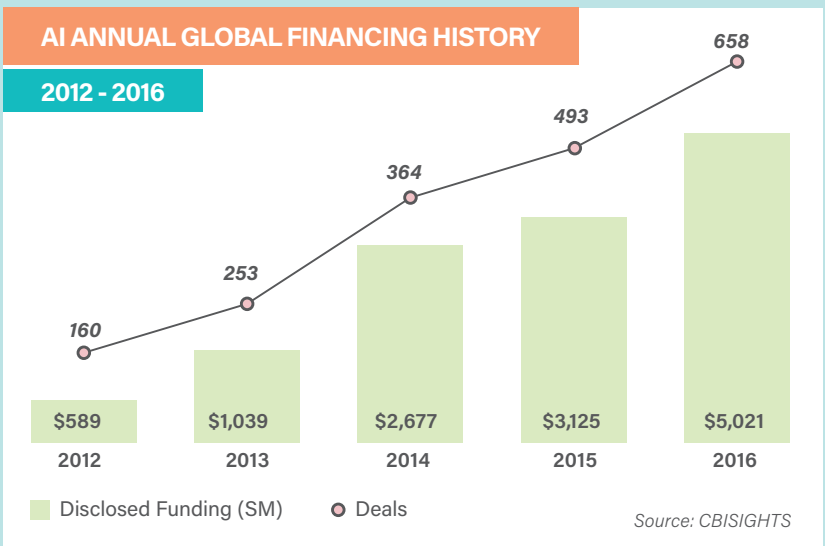


Figure 3: *Increasing global trends of financing start-ups*

> *Machines which are known to perform assembly of parts in production line of a factory are slowly replacing jobs that are currently performed by humans—not limited to factory workers but including professionals such as doctors, lawyers, accountants, truck drivers, police, builders, cooks, journalists, composers and surgeons.*

USD589 million in 2012 to USD 5 trillion which is almost eight (8) folds in just five (5) years. **(Figure 3)**

According to IFR World Robotics, there has been a steady increase of industrial robots from 2010 and it is projected to grow with an average of 15 percent from 2016 to 2018 **(Figure 4)**. The IFR estimates that there are currently between 1.5 and 1.75 million industrial robots in operation, a number that could increase to 4 to 6 million by 2025 (Boston Consulting Group, 2015). China is leading in terms of installing more robots compared to other countries in the world followed by South Korea, North America, Japan and Germany. Companies are considering the smart machines with such capabilities because it they can deliver higher output with lower cost and comes without welfare entitlements. However, there are five (5) key factors that will influence the pace and extent of these smart machines, including technical feasibilities, cost of developing and deploying solutions, supply, cost and benefits of human labour as an alternative to automation, productivity rate and regulatory and social acceptance.

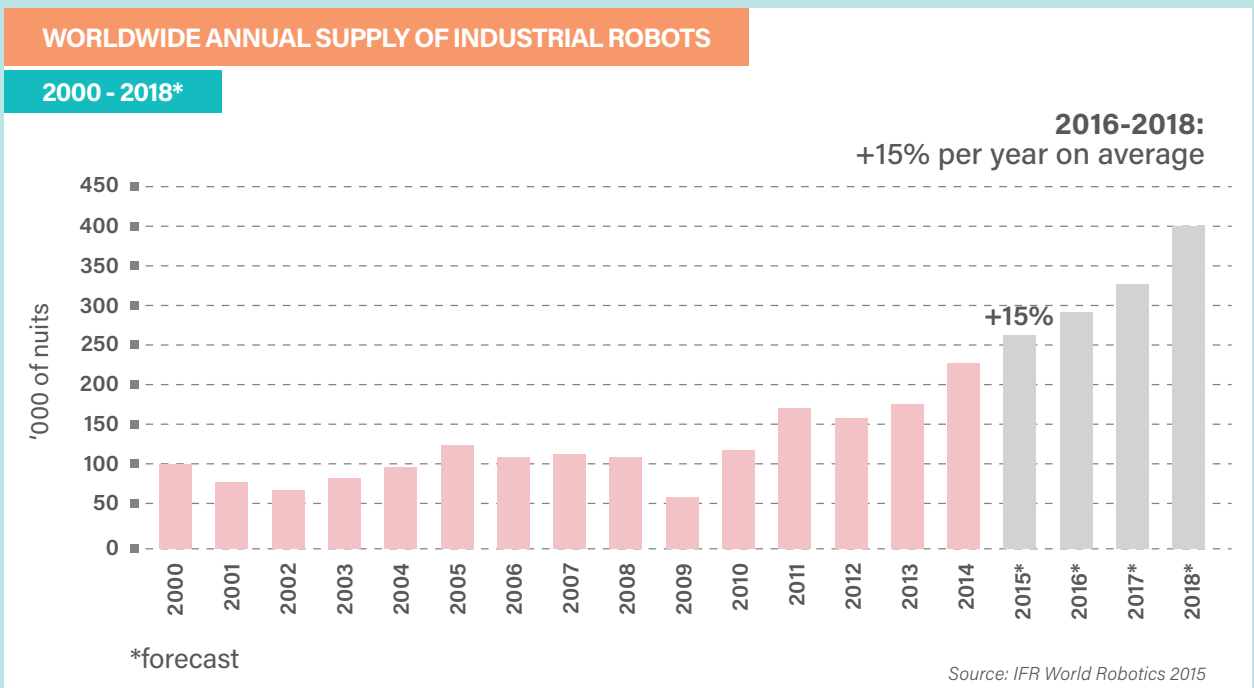


Figure 4: *Worldwide annual supply of industrial robots*

TREND 10:
Green & Sustainability

The effects of climate change such as global warming, rising of sea level, drought, haze, and flood, calls for a global response to ensure the Earth is habitable for many years to come. The race for economic growth has continuously put the pressure on existing resources and without a sustainable mind-set, the damage costs of climate change will be increasing over time, thus compromising the need of future generations. In addressing this, initiatives such as Sustainable Development Goals 2030 are a universal call to action to end poverty, protect the planet and ensure that everyone can enjoy peace and prosperity.

> *The race for economic growth has continuously put the pressure on existing resources and without a sustainable mind-set, the damage costs of climate change will be increasing over time, thus compromising the need of future generations.*

Respective countries are formulating their plans to combat the effects of climate change particularly in the mobility sector. For example, Emmanuel Macron's government has announced that France will end sales of petrol and diesel vehicles by 2040 as part of an ambitious plan to meet its targets under the Paris climate accord (Guardian). Following suit, The U.K. would ban sales of new gasoline and diesel cars starting in 2040 as part of a bid to clean up the country's air and by 2050, all cars on the road will need to have zero emissions. The Norway's government's transportation plan outlines a clear target—All new passenger cars and vans sold in 2025 should be zero-emission vehicles. Moreover, India made a bold statement that every vehicle sold in the country should be powered by electricity by 2030. At least 10 other countries have electric car sales targets in place, according to the International Energy Agency (IEA)—Austria, China, Denmark, Germany, Ireland, Japan, the Netherlands, Portugal, Korea and Spain have set official targets for electric car sales.

Many carmakers are echoing the same sentiments by expanding their product lines into making electric cars. Tesla is leading in this market share and taking a cue from the electric car manufacturing leaders. President and Ceo of Volvo stated that starting 2019 onwards, all vehicles manufactured by Volvo would either be hybrid or electric. Toyota Motor Corp and Mazda Motor Corp recently announced they would join forces to develop electric vehicle technologies. Other car makers including BMW, Daimler, Nissan-Renault, Hyundai-Kia, Ford, General Motors, Subaru, and Volkswagen are expanding their product portfolios to include electric cars.

Smart is the new green where the trend of green products will be replaced by smart products and services. This is driven by technologies such as internet of things (IoT), machine learning and advanced materials. Application of the technologies into the smart cities concept to include smart energy, smart mobility and smart building will also occur as well. As an example, China is building vertical forests that will contain more than 1,100 trees and 2,500 plants that will produce 60kg of oxygen a day and absorb 25 tons of CO_2 every year.

Challenges

Based on trends provided, these are the anticipated challenges and why it is imperative for the stakeholders to be on alert in facing the future of work.

TOP SIX FUTURE CHALLENGES

CHALLENGE 1:
Declining of Working Population

ILO projected rate of labour participation is expected to stabilise at 62.8 percent of the global working-age population and subsequently exhibit a moderate downward trend to 62.5 percent until the year 2020. However, it is suggested that the trend may continue to decline until year 2050. **(Figure 5)**

The decline is due to the slow recovery of the economic cycle caused by the increasing aging population and longer learning years that shrinks the working age population growth. Developed and emerging economies are likely to experience further decline in activity rates, while developing economies are expected to be more stable. For example, in Malaysia, the working age population was at 65 percent in 2016 and recorded an increase of 0.2 percentage points as compared to 2015.

Will Malaysia maintain the growth or decline in the next 10 or 20 years owing to aging population, low birth rate and economy uncertainty?

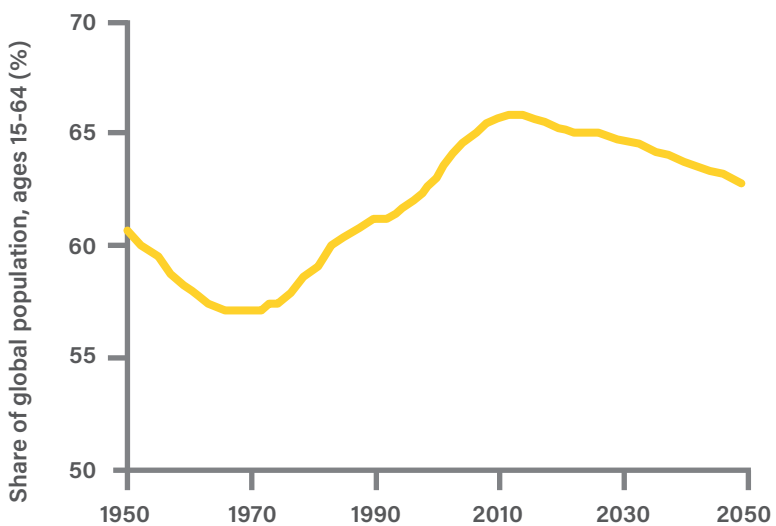
CHALLENGE 2:
Multi-Generational Culture

For the first time in history, by 2020 there will be at least four generations—Baby Boomers, Generation X, Generation Y (or Millennials) and Generation Z—that will be working together in a workplace. Here, employers will face the challenge of managing a workforce while having to consider the unique strengths and differences of each generation.

Different ways of thinking, communication, expectation, values, characteristics and preferences may create friction in the multi-generational workforce. This scenario may materialise due to perception of negative stereotypes on a particular generation. As an example, millennials may be referred as lazy, technology obsessed, overeager to challenge norms while the older generation is posed as rigid, difficult to train, hierarchical and procedure oriented.

How can employers offer the ideal workplace to attract the best talents from different generations? What type of mechanism is required to motivate a multi-generational workforce to enable a business to meet its goals?

The Global Working-age Population Growth



Source: International Labour Organization (ILO)

Figure 5: *The global working-age population growth*

CHALLENGE 3:
Large Number of Jobs are at Risk

The rise of automation and robots has brought along transformation to jobs traditionally undertaken by human for decades. In view of enhanced capabilities to perform tasks beyond non-cognitive and routine activities, alarming signals has been raised globally especially to policy makers, industry players and academicians. The advancement of technology is currently feasible to automate job activities that involve predictable physical work, data procession and data collection. **(Figure 6)**

The World Bank estimates that 57 percent of jobs in the OECD could be automated over the next two decades (World Development Report, 2016). The risks are varied from country to country, for example, China (77 percent), India (67 percent), UK (35 percent) and USA (47 percent). The jobs at risk include; high risk jobs such as waiter/waitress, receptionist, insurance sales agents, cooks/ bakers, secretary and low risk jobs such as software developer, scientist, nutritionist, nurses, sport coach.

The impact of automation and robots has already begun. A company in Dongguan City, China known as Changying Precision Tech has replaced 90 percent (650 people) of its employee with 60 robots and in Europe, it is more cost effective to deploy robots compared to humans. For example, a car worker in Germany costs more than €40 (£34) an hour, while a robot costs between only €5 and €8 per hour. This time around, automation and robots are making a wider leap not only comprising of low-income jobs but for the middle-income jobs too. Consequentially, the fields of professionals with more specialised jobs will be impacted as well.

In the long run, it will bring a significant impact to the growth of the economy as a large number of consumers are from the middle-income group. Moving up to higher skills and knowledge in the current field to be promoted in the workplace seems to be inadequate for the future. The future of work requires workers to move up vertically and horizontally in terms of developing multiple skills and knowledge of other fields.

This scenario is inevitable in Malaysia where the main economy is driven by services and manufacturing activities. Is the country ready to weather such challenges?

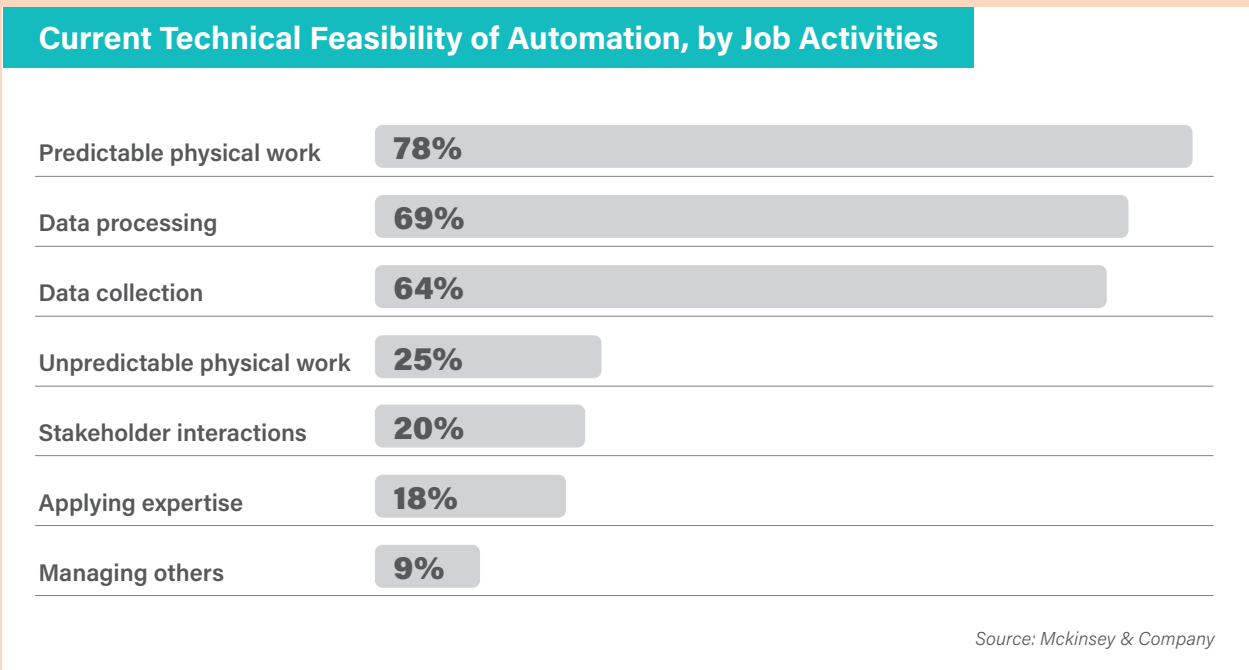


Figure 6: *Current Technical Feasibility of Automation, by Job Activities*

> *Educational systems have not kept pace with the changing nature of work. A global annual survey conducted in 2016 by Manpower Group discovered that employers have reported an increase in talent shortage.*

CHALLENGE 4: Greater Mismatch

Educational systems have not kept pace with the changing nature of work. A global annual survey conducted in 2016 by Manpower Group discovered that employers have reported an increase in talent shortage. The result shows that 40 percent of employers globally are facing difficulty in filling vacant positions in 2016 and this figure is the highest since 2008. Several reasons contribute to this mismatch and lack of available applicants, lack of hard skills (technical competencies), lack of experience, looking for higher salary and lack of soft skills (workplace competencies) are among the top.

According to a McKinsey survey on young people and employers in nine countries, 60 percent of new graduates are not adequately prepared for the working world. There were gaps in both technical skills such as STEM subject degrees and also soft skills such as communication, teamwork and timeliness.

How will schools, training institutions, colleges and universities revamp their syllabus to continuously adapt to the changing nature of work?

CHALLENGE 5: Raising the Bar

Trends such as globalisation, generational shift and advancement of technology have created the gig economy—described by Oxford Dictionary as a labour market characterised by the prevalence of short-term contracts or freelance work as opposed to permanent jobs. In a nutshell, it is simply work performed through digital platforms. It offers companies access to a global talent pool and consequently fuels freelancing activities. Workers and customers can connect through an online platform and receive payments for specific tasks.

Digital natives such as the Millennials are the most optimistic group about freelancing due to their inclination towards entrepreneurship. A study on gig economy found that 93 percent of companies are comprised of a blended workforce as freelance workers team up with employees to work on certain projects together.

In the United States, independent workers represented 34 percent of the total workforce in 2014 and are anticipated to reach 50 percent by 2020 (Freelancers Union of USA). This phenomenon is on the rise globally.

The more pertinent question is: How can the Malaysian education system produce a future workforce that is competent and equipped to compete with their peers around the world?

CHALLENGE 6: Digital Divide

According to United Nations International Telecommunications Union (ITU) in its report *State of Broadband 2016,* there is an increasing divide between the connected world and the un-connected world. More than half of the world population (3.9 billion) is still offline due to high cost and inaccessibility, preventing them from gaining equal opportunity in terms of access to people, education, jobs opportunities, information and other perks provided by the digital economy.

Connect 2020 set by ITU, plans to get 60 percent of world population to be online by 2020, which translates to bringing 1.2 billion people online for the next four years. According to McKinsey, there are five trends that helped increase the number of population into online community for the past decade, which are (1) expansion of mobile-network coverage

and increasing mobile-Internet adoption, (2) urbanisation, (3) lower device and data-plan prices, (4) growth of middle-income group and (5) increased utility of the Internet.

As of 2015, the offline population in Malaysia was at 22.4 percent. However, the number of internet users has increased from 57 percent in 2013 to 77.6 percent in 2015 (Malaysia Communications and Multimedia Commission (MCMC)).

Can Malaysia achieve 100 percent population online in the future? Is digital inclusiveness one of the enabling factors in realising Transformasi Nasional 2050 (TN50)?

“... there are five trends that helped increase the number of population into online community for the past decade, which are (1) expansion of mobile-network coverage and increasing mobile-Internet adoption, (2) urbanisation, (3) lower device and data-plan prices, (4) growth of middle-income group and (5) increased utility of the Internet.”

CLOSING

There are still a huge number of challenges ahead of us as we anticipate the impact of future trends on a global economy and changes in the workforce. Only with every stakeholder working together to anticipate the impact of the various forces, and maintaining a continuous conversation at different levels will we be able to capitalise on the rising flow of information in the era of big data. Informed input may then be provided to decision makers to enable them to design a comprehensive policy for the country. In addition, these outcomes and actions should be actively communicated through multiple channels to create a common understanding at the grass-root level.

The Future of Work: How Can We Navigate Through Disruptiveness of 4IR

Automation, robotics, artificial intelligence and machine learning are impacting how we get things done, how companies operate, and how organisations as well as its leaders and managers relate to their employees. With the rising complexities and uncertainties in today's world, it is crucial for countries and companies to prepare and adapt to a fast-evolving environment in the future by managing disruptions and identifying opportunities. Here we highlighted 7 options to assist leaders to excel in future world of work. These options are gathered based on on-going discussions, expert opinions, and report findings.

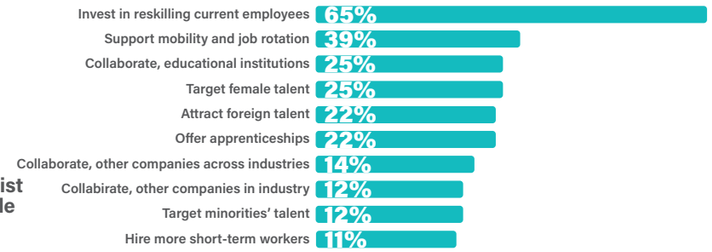
OPTION #1

review of EDUCATION & TRAINING

"high-demand jobs will need a mix of **hard specialist knowledge skills, or STEM skills; and soft people skills**, such as critical thinking, communication, collaboration and creativity"

- the Regional Australia Institute

Figure 13: Future workforce strategies, industries overall
Share of respondents pursuing strategy, %



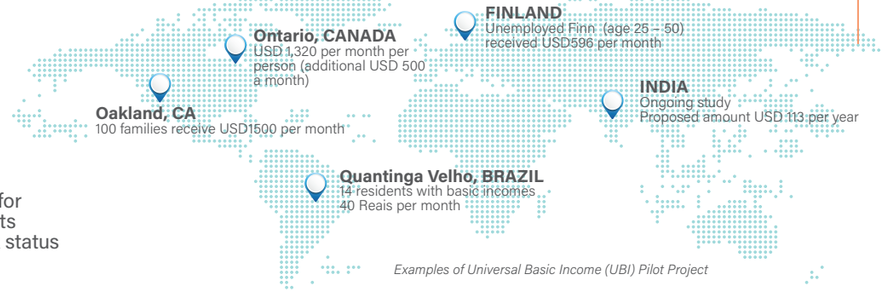
Source: Future of Jobs Survey, World Economic Forum.
Note: Names of strategies have been abbreviated to ensure legibility.

OPTION #2

universal BASIC INCOME (UBI)

...a fixed amount, at a level sufficient for subsistence, given by the state to all its citizens regardless of income or work status

- Futurism



Examples of Universal Basic Income (UBI) Pilot Project

"I don't think we're going to have a choice. I think it's going to be necessary. There will be fewer and fewer jobs that a robot cannot do better."
– Elon Musk, CEO of SpaceX and Tesla

"we've got to help create better opportunities for them without just giving up and saying, 'Okay, fine, [...] you don't really have to do anything anymore.' I don't think that works for a democracy and I don't think it works for most people."
– Hillary Clinton, former US First Lady

"one of the worst possible responses."
- Mark Cuban, television personality and chairman of AXS TV

"Over time, countries will be rich enough to do this, However, we still have a lot of work that should be done — helping older people, helping kids with special needs, having more adults helping in education."
– Bill Gates, co-founder of Microsoft

"We should explore ideas like universal basic income to make sure that everyone has a cushion to try new ideas,"
– Mark Zuckerberg, CEO of Facebook

"Whether a universal income is the right model — is it gonna be accepted by a broad base of people? — that's a debate that we'll be having over the next 10 or 20 years."
– Barack Obama, Former President of the USA

OPTION #3

tax on ROBOTS

- Slow the pace of automation
- Fund alternative careers for those who lose their jobs
- Finance more jobs in education and caring for the elderly
- The Government will need to offset the potential drop in tax revenues from human workers

"The robot that takes your job should pay taxes"

- Bill Gates
Co-founder of Microsoft

OPTION #4

human job QUOTAS

governments to legislate for quotas of human workers, upend traditional working practices and pose novel dilemmas for insuring driverless cars

- the International Bar Association Global Employment Institute (IBA-GEI)

"... Nor does a robot "become ill, have children or go on strike and [it] is not entitled to annual leave" ..."

"... Increased mechanical autonomy will cause problems of how to define legal responsibility for accidents involving new technology such as driverless cars. Will it be the owner, the passengers, or manufacturers who pay the insurance? ..."

"... (In military) Limits will have to be imposed on some aspects of machine autonomy ... there must always be a 'human in the loop' to prevent the development and deployment of entirely autonomous drones that could be programmed to select their own targets ..."

OPTION #5

negative INCOME TAX

Giving cash to poor or jobless people instead of taxing them

OPTION #6

government JOB GUARANTEE

The Government would employ the jobless as the "employer of last resort"

"... It all falls over at two points, the first is that labour simply isn't homogeneous these days, which leads to the second, well, which jobs? ..."

"... It operates like a buffer stock: in a boom, employers will recruit workers out of the program; in a slump the safety net will allow those who lost their jobs to preserve good habits, keeping them work-ready. It will also help those unable to obtain work outside the program enhance their employability through training. Work records will be kept for all participants and made available to potential employers. ..."

OPTION #7

broader SAFETY SAFETY NET

Better welfare state systems to cushion the impact of automation

"... Think universal healthcare, affordable education, accessible childcare options – for better or worse. While some economists have argued such programs have actually been growth retardants in the long-run, it's hard to dispute they make it easier to get through a recession. ..."

For the sources behind this infographic, please visit: www.myforesight.my

Jobs at Risk

The profound advances in technology have found ways to serve as substitutes for human capabilities. We've seen this on TV, films and books, now the alarming concerns have found their way into academic discourses. Soon robots will be able to do almost everything—including the most sophisticated brain work.

Jobs at Risk describe the impact of automation and robotics on jobs clustered in four groups; Professional Services, Manufacturing, High Touch Services and Low Entry Barriers Works.

Here, the Jobs at Risk are summarised, with the level of automation and robotic impact in replacing humans illustrated by percentage (%). As progress continues, the jobs at risk may slowly cease to exist—squeezing the opportunities in employment and fewer people in the industry will be necessary.

Low Entry Barrier Works

workers need minimal skills and experiences or only ordinary-level education qualifications. The jobs usually give recruits the benefit of a gainful occupation, opportunity to learn and gain experience, besides serving as a stepping-stone for higher-level jobs.

Manufacturing, Technical & Maintenance

is a field that involves planning, directing and coordinating activities concerning the production of goods. It requires technical know how such as studying and advising on technological aspects of manufacturing processes, conducting research and improving or developing concepts and theories as well as operational methods.

High Touch Services

covers occupations of the type that involve close relations with consumers or clients, requiring skills to understand the specific need of clients.

Professional Services

are jobs that require special training and higher education degree in the field of arts or science. Professionals proliferate the existing stock of knowledge by applying scientific and artistic concepts and theories as well as teaching foregoing analysis in a systematic manner.

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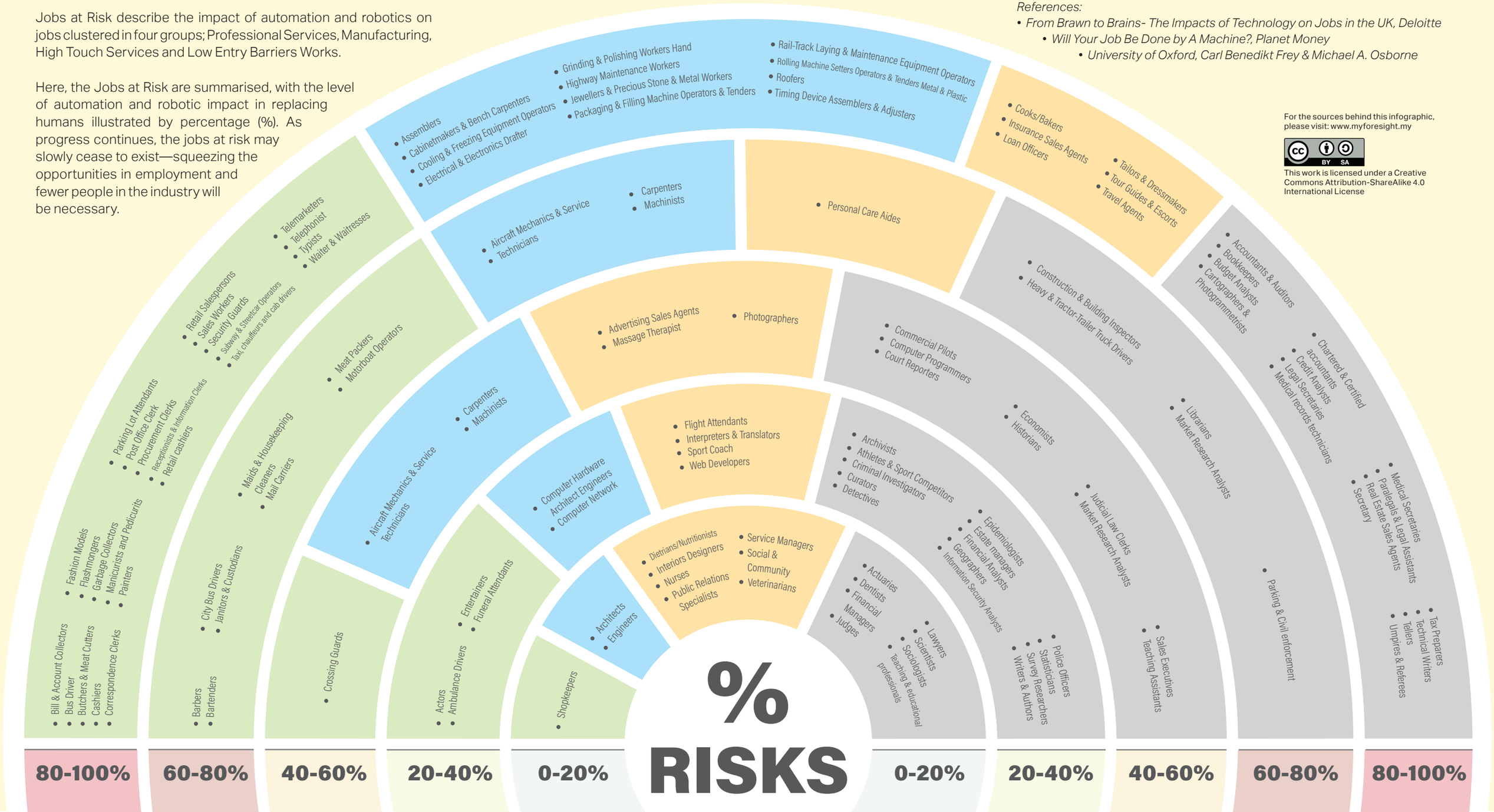
For the sources behind this infographic, please visit: www.myforesight.my

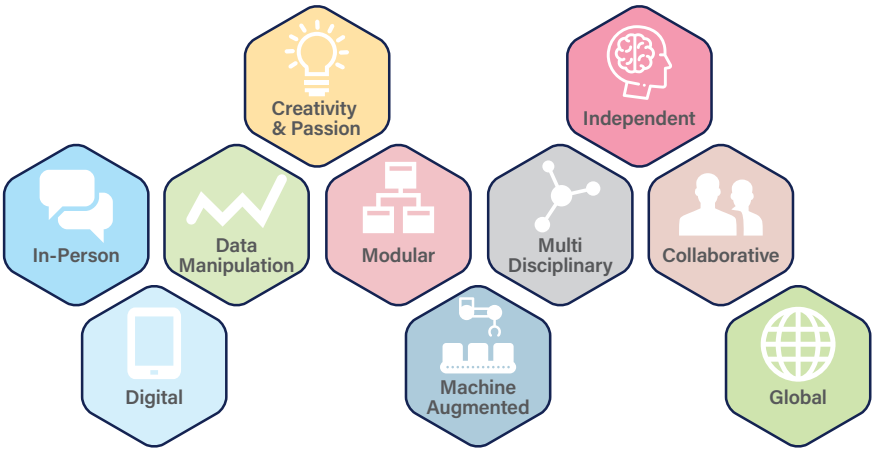


Future Work, Workforce, Workplace

by | Mohd Hasan Mohd Saaid
hasan@might.org.my

The 4th Industrial Revolution will not only bring opportunities but introduce disruption to our work, the larger workforce, as well as the workplace as we know it today. These changes are occurring at an accelerated pace due to the advancement of digital technology. Subsequently, the fast rate of innovation is fuelling the creation of new economy that clearly impacts both public and private entities.

Work of the Future



As the future evolves, the convergence of industry in current sectors becomes clear, reducing the lines of demarcation originally defined and codified almost 80 years ago. The future work is expected to be digital in nature, requiring data manipulation, and most importantly, will highly be augmented or assisted by machines.

Although AI and automation will replace many job positions, neuroscientist Tara Swart believes that positions **with deep human** skills covering multi-disciplinary, collaborative, independent and creative jobs are rising in job market value. Type of jobs will become modular, which means it can be assigned individually on a global level.

Work quality and **employee productivity** however, will still be the focus of future work. With modern technology, there would be higher gains in these two focus areas. The drawback to these gains is that they will be more beneficial to the employer than to the workers due to the potential of job automation by machines or robots.

The percentage of jobs at risk to be replaced by automation varies by country. An OECD survey puts the average of jobs at risk at 57 percent. In Malaysia, a MIGHT analysis classifies the risk in accordance to the worker's skill level. 16 percent of Malaysian jobs are at low risk of automation—these include doctors, teachers, engineers, police and chefs. Meanwhile, 30 percent of Malaysian jobs at risk of automation covers technical occupations like technicians, mechanics and repairmen. Jobs for semi-skilled workers such as clerks, telemarketers, factory workers and receptionist are at 54 percent risk of automation.

Malaysian Jobs at Risks of Automation

LOW RISK
16%

High skilled/specialised workers:
Doctors, teachers, engineers, police, chefs

MEDIUM RISK
30%

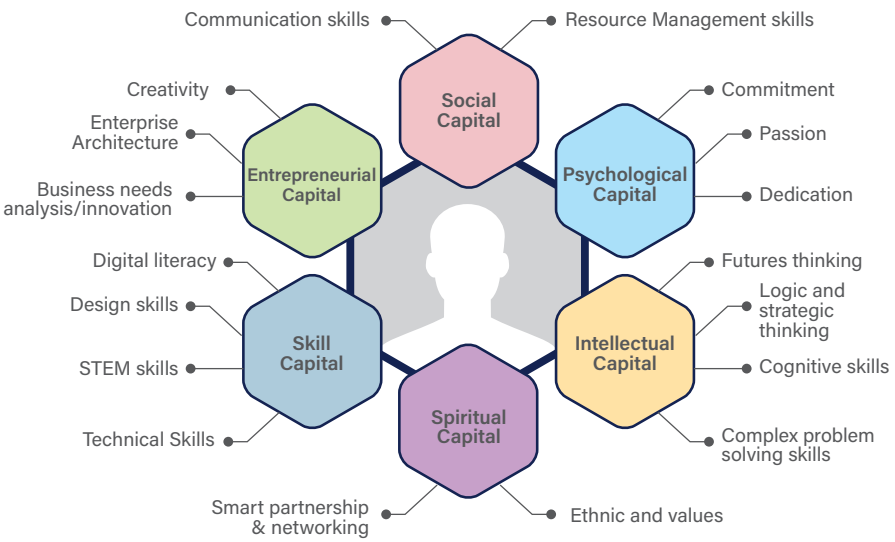
High-low skilled workers:
Technicians, mechanics, repairmen, cleaners

HIGH RISK
54%

Semi skilled workers:
Clerks, telemarketers, sales, factory workers, receptionist

Workforce of the Future

> *People who are capable of recreating themselves and recreating their capabilities are the ones who will be most succesful*



The model above depicts the type of workforce in the future, adopted from Tan Sri Omar's book, "*The Essentials of Science, Technology and Innovation Policy*". The book mentioned that an employee's skills should include aspects of Social Capital, Psychological Capital, Intellectual Capital, Spiritual Capital, Skills Capital and Entrepreneurial Capital.

For example, Social Capital consist of communications and resource management skills. With the era of big data, data scientists should be able to manipulate and communicate important data well through data visualisation, to enable evidence based decision-making.
While Intellectual Capital covers the area of future-, logic- and strategic thinking, cognitive skills as well as complex problem solving skills required in a future workforce, (as also described in WEF's Skills of the Future).

Entrepreneurial Capital relies on the workforce monetisation of skills.

Capitalising on the creativeness and innovativeness of workforce, through design-, STEM- and Technical Skills, digital literacy, along with Smart partnership and networking. Digital literacy is a must in the future of workforce due to the nature that the backbone of The 4th Industrial Revolution is digitalisation. Computer coding is already implemented as part of the primary curriculum in England, Belgium, Finland, Estonia and the Netherlands.

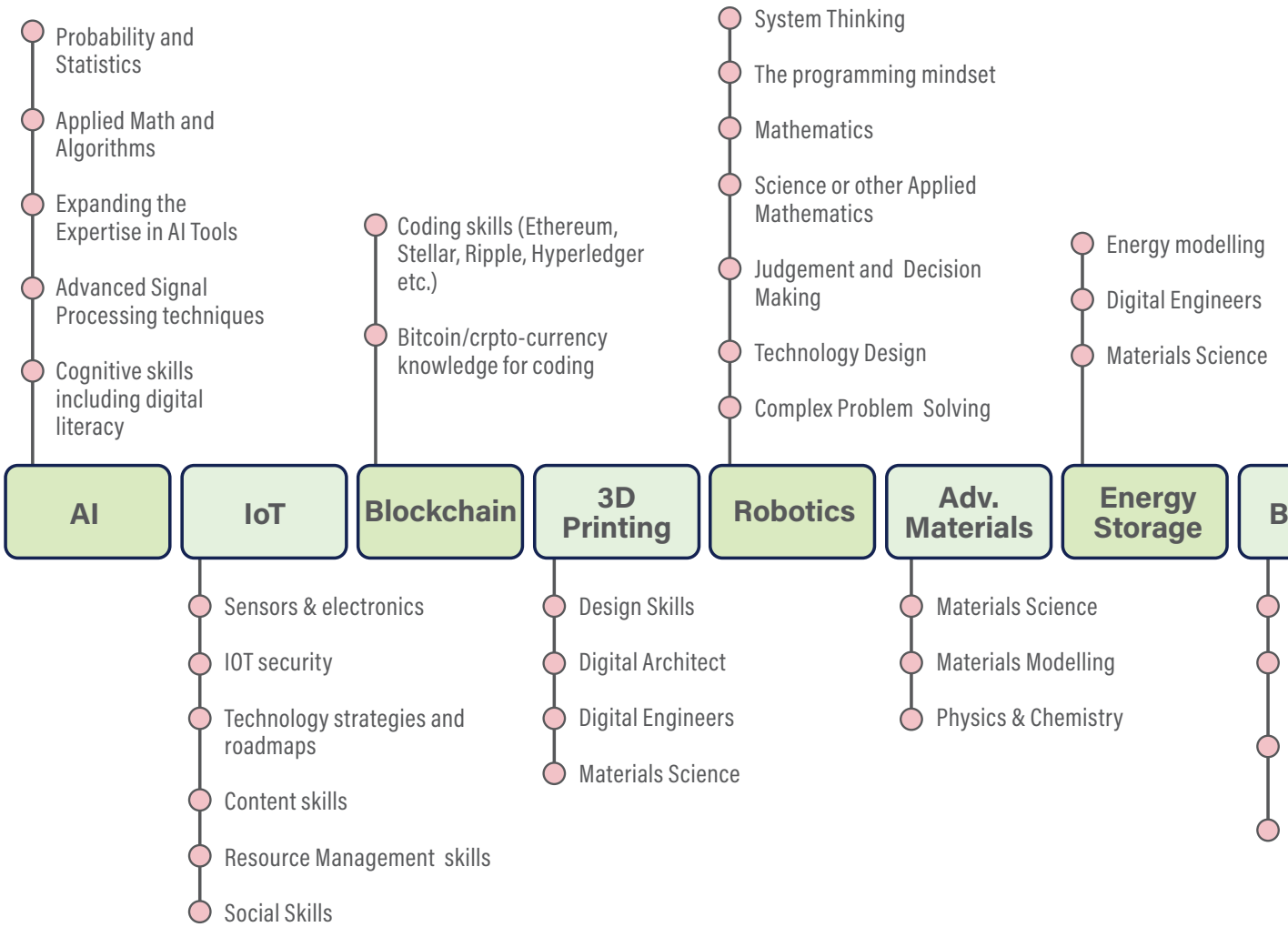
In the long run, every worker's future is dependent on the ability to continuously acquire knowledge and improve his or her skills in order to survive. It is already a known fact that in the future, the workforce can be diverted away from the 3D (dirty, dangerous, and difficult) jobs by replacing them with automation and robotics. But today, AI is already disrupting occupations that were long considered immune to technological displacement such as white-collar work and creative endeavours. As a result of this development, it is very unlikely that any employee can consider their current jobs future-proof.

While technologies replace some jobs, at the same time technology also create new work opportunities. Automation and AI will lead to collaboration between man and machine. In most cases, automation will take over specific repetitive or mundane tasks—according to a study by ServiceNow, 94 percent agreed that when repetitive tasks are automated, the demand for soft skills jobs will grow.

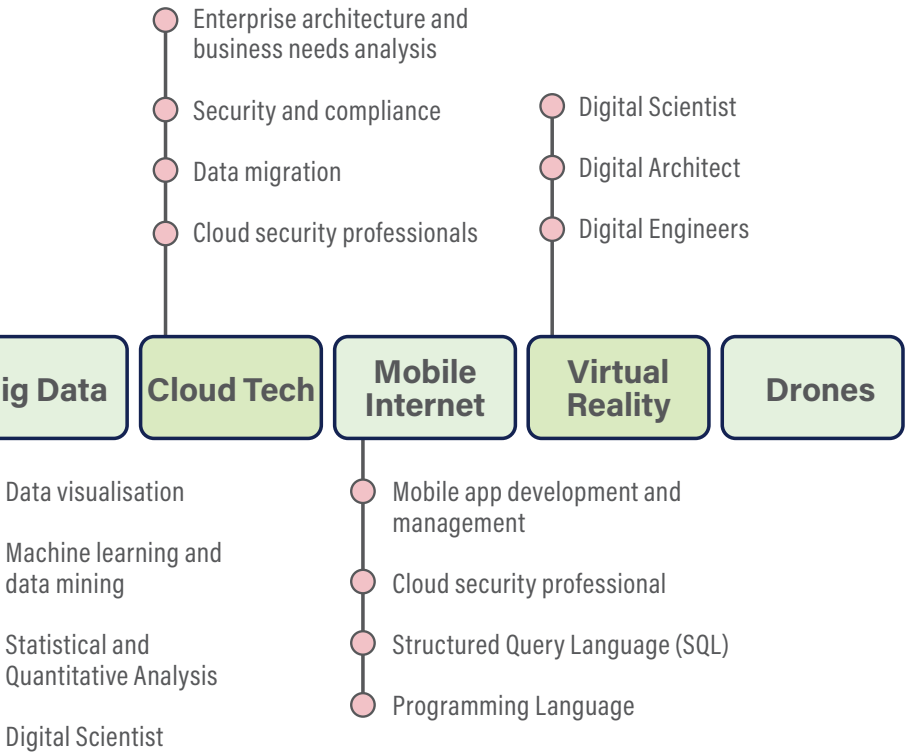
A popular survey from the World Economic Forum (WEF) states that 65 percent of children entering primary school today will partake in jobs that do not yet exist and for which their education will fail to prepare them. This points to the size of the challenge to mitigate skills gap and reduce unemployment in the future workforce. Since by 2025, 75 percent of the global workforce will be comprised of millennials, the workplace of the future needs to be designed with this group in mind. For instance, over 97 percent of millennials say that work-life balance in the future is important to them. The future workforce may also require higher participation from the female and aging population pool of workers as well as migrants to increase opportunities.

Type of Jobs Created/Skills Required from Selected Technologies

New technology creates more opportunities for workers with more skills



MIGHT Analysis further provides an overview of skills required from 12 key technology areas of the future. The 12 key technology are; Artificial Intelligence, Internet of Things (IoT), Blockchain, 3D Printings, Robotics, Advance Materials, Energy Storage, Big Data, Cloud Technology, Mobile Internet, Virtual Reality, and Drones. Some of the technologies shared the same skills required to be master.



** This list is not exhaustive and being updated*

Source: MIGHT

Workplace of the Future

Important aspects of an ideal future workplace are Wellness, Green, Technology Driven, and Collaborative. It is no longer the physical place that define a workplace of the future, because what we can carry with us—digital devices such as mobile phone, laptops and tablets—to get the job done, matters more.

> *The ideal workplace of the future will be one where culture and humanity co-exist as business leaders' focus their priorities on creating a 'great place to work' environment.*

Wellness

Wellness represent the internal element of workforce where inclusion and flexibelity contributes to the overall harmonisation of a workplace. Over the past decade, employers have come to understand the importance of physical well being and its effect on the happiness and productivity of employees. A flexibile work arrangement may be in the form of telecommuting and/ or part-time schedule will no longer be a negotiating strategy or job perk but an expected job benefit. Trends show that more employees enjoy flexible work with evidence from Gallup survey showing 43 percent of American workers working remotely at least part of the time as of 2016.

Green

Environmental friendly and sustainable working environment in the future of workplace will involve both employers and employees to apply change. Workplace will be very focused on sustainability, well-being, and eco-living. Organisations will no longer be focusing on revenues and market shares, but instead believe that they are making a difference in the world as well as imposing positive social and environmental impact. The workplace will invest heavily in collaboration technology and conferencing solutions to avoid employees from having to travel and subsequently reducing carbon foot print.

Collaborative

Workplace of the future will be a place where culture and humanity co-exist as business leaders will prioritise in creating a balanced place of work. To achieve this, organisations must be better equipped at understanding and developing their workforce management skills.

In the freelance economy (gig economy), professionals can participate in digital marketplaces to secure a greater volume of assignments, promote marketing, practice secure payment systems and vet potential clients. A study exploring the gig economy found that 93 percent of companies imagined a future blended workforce as they see freelance workers teaming up with employees to work on projects together.

Co-creation is also heavily embraced as organisations team up with customers, partners, employees and other constituents to develop products and services. The structure of organisations needs to reflect the changing nature of work. Organisations should seek ways to flatten the hierarchy, making jobs more dynamic, and further leverage on contingent and contract labor in the future.

Technology Driven

It is imperative for a workplace to be technology driven as it is the main enabler for work to be done productively. Any industry related services will require digital platform as a medium to interact with clients. Workplace designs need to incorporate new trends such as mobility and application of new technology that will enable workers to deliver their work effectively and autonomous vehicles in the future may even be used not only for commuting but as a mobile office. For example, Global design consultancy IDEO has developed a series of concept vehicles that imagines how autonomous vehicles could transform the way we work. Augmented Reality (AR) or Virtual Reality (VR) is also an example that work can be done without needing specific workstations.

> *The distinction between our **work lives and personal lives has blurred**, workplace is no longer **where** but **what we carry***

Conclusion:

While uncertainties exist with regards to the impact of automation and AI in the future of work, exploring futures scenarios enables stakeholders to understand its impact toward their specific areas and to anticipate ways to cushion its impact. Governments can play a bigger role and provide supporting policies in managing ethics if social security issues like mass unemployment due to automation and AI materialise.

If self-driving taxis are to become a reality in the upcoming years, the displacement of current taxi services is an issue we need to address with the utmost urgency. The actions we will be taking in the taxi industry should already be a wakeup call that everyone is not left unaffected by the coming 4th Industrial Revolution. This utmost concern applies across the manufacturing industries to ponder on the uncertainty of their future. *The question is, what will the future holds for you and your next generation?*

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Workplace of the **Future**

The workplace of the future will be an environment where technology advancement will aid different working ability and skills, nurture physiological health, create and all-encompassing, intelligent and intuitive, as well as highly supporting collaborative works.

i Ageless:

a workplace which allows 'returnment', encouraging older workers to remain or return to the workplace instead of retiring, and sees workers' energised to continue to work until a later age because they want to, rather than have to

ii Mindful:

a workplace which nurtures mental health and encourages workers to recharge mentally and achieve balance in their busy hyper-connected, digital lifestyles

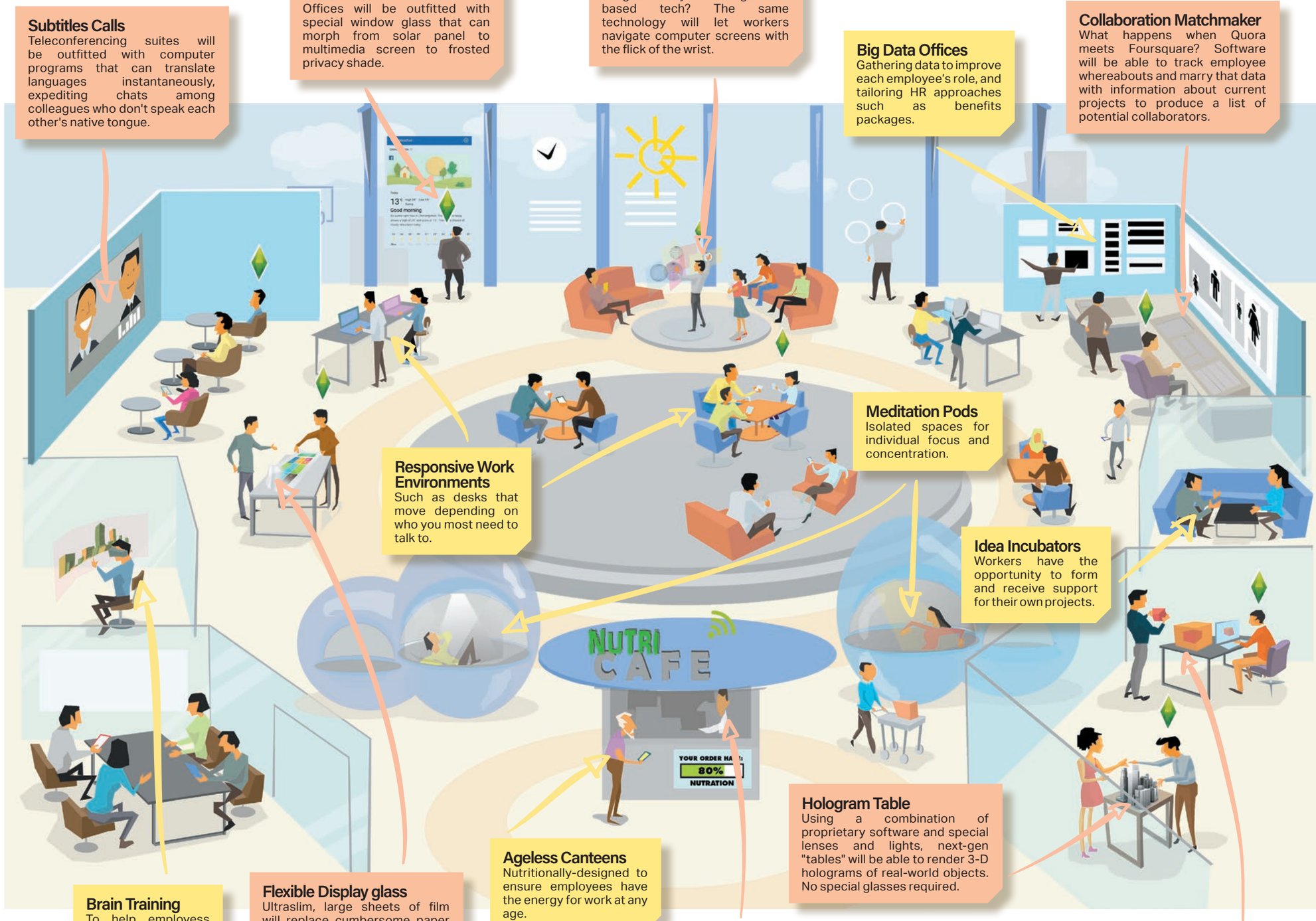
iii Intuitive:

a workplace that uses data and insight on its workers' environment, mood, wants and needs to create an all-encompassing, intelligent and intuitive environment

iv Collaborative:

a workplace that embraces the collapse of traditional structures to promote open and social exchange, operating a flat structure and embracing the impact of more women in the workplace

The office a few years from now will in most ways physically resemble the office of today. People will still sit at desks and meet in conference rooms and get food from the cafeteria. The big changes to the way we work will be in the gadgets - they will be as powerful as mainframes, allowing workers to do heavy computing work, like product design, on the go. Tiny sensors will monitor your movements and, based on the departments you visit, recommend potential co-workers to meet and work with.



Subtitles Calls
Teleconferencing suites will be outfitted with computer programs that can translate languages instantaneously, expediting chats among colleagues who don't speak each other's native tongue.

Smart Glass
Offices will be outfitted with special window glass that can morph from solar panel to multimedia screen to frosted privacy shade.

Gestural Interfaces
Imagine Tony Stark gesture-based tech? The same technology will let workers navigate computer screens with the flick of the wrist.

Big Data Offices
Gathering data to improve each employee's role, and tailoring HR approaches such as benefits packages.

Collaboration Matchmaker
What happens when Quora meets Foursquare? Software will be able to track employee whereabouts and marry that data with information about current projects to produce a list of potential collaborators.

Responsive Work Environments
Such as desks that move depending on who you most need to talk to.

Meditation Pods
Isolated spaces for individual focus and concentration.

Idea Incubators
Workers have the opportunity to form and receive support for their own projects.

Brain Training
To help employess stay mentally young by exercising the brain.

Flexible Display glass
Ultraslim, large sheets of film will replace cumbersome paper blueprints. Designers can flip through hundreds of documents and make changes on the fly.

Ageless Canteens
Nutritionally-designed to ensure employees have the energy for work at any age.

Hologram Table
Using a combination of proprietary software and special lenses and lights, next-gen "tables" will be able to render 3-D holograms of real-world objects. No special glasses required.

Cafetaria Culture
Apps on phones and desktops will let employees peruse the menu, order, and pay for lunch. All they'll need to do is pick up their meal.

3D Printers
Affordable desktop-size 3-D printers will let workers churn out small prototypes, hastening the productdevelopment cycle.

VIEWPOINTS

Creating Women's Future of Work Today

by:

Nadia Sullivan
nadiasullivan@might.org.my

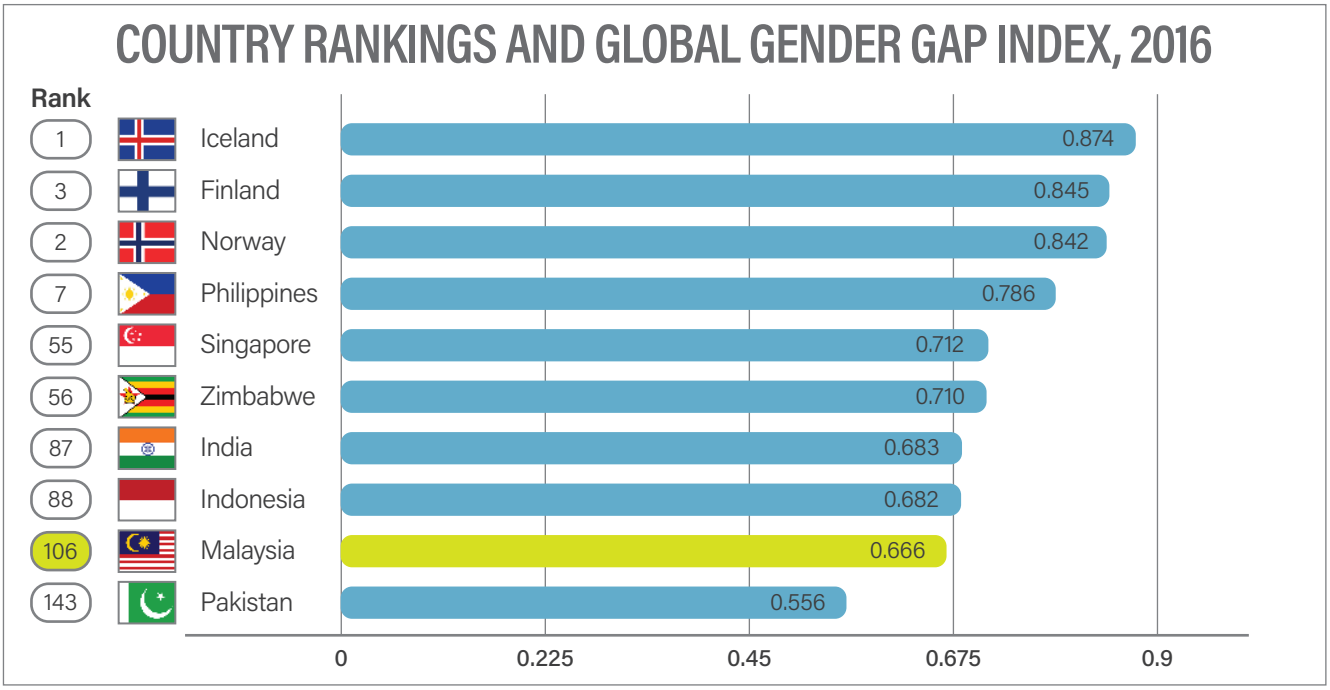
*The world as we know it is rapidly changing in terms of economic, political, and social development, thanks to the advancement of technology as one of the major contributors. In this article, we will look into the **Future of Work**—a complex new buzz term that is directly correlated to how we do things in our lives as most of our time is spent on working—with a special focus on where women stand in the global workforce of the future.*

Half of the working women population in Malaysia are still not in the workforce despite government's effort to encourage more female participation.

Whether in household or workplace, women are still not given an opportunity equal to that of men to thrive and succeed. According to UN Gender Statistics Report 2015, although the education gap has been narrowed significantly, in other areas, not much progress can be seen. The current world labour force comprises only 50 percent of women compared to 77 percent men.

The 2016 World Economic Forum Report highlighted the gender gap in four key areas: namely health, education, economy and politics. According to that report, Malaysia ranks 106th out of 144 countries, proving that strategic efforts need to be undertaken to close the gender gap. As of 2016, there were a total of 14.7 million workers in the workforce in Malaysia, with almost 8 million of the workers being female. A direct data comparison shows that this number is an increase of 0.2 percent from the previous year.

Half of the population of women in Malaysia eligible to work are still not in the workforce, despite the government's effort to encourage more female participation. Although significant progress has been made for the past six years and there are more women in the workforce compared to thirty years ago, the gender gap is still comparatively wide. Women are still finding it difficult to break the glass ceiling partly due to gender stereotyping in the workforce that hinder them to perform better. Overall, women are still far from having an equal voice to men in public and private spheres, and are still subjected to various forms of gender disparity.



Source: World Economic Forum report 2016

Are Women Losing Jobs to Technology and MEN?

As we entered the fourth industrial revolution, businesses and organisations especially startups, are inching in toward new era of work—away from traditional work environment (8-hour office job, rigid leader-subordinate structure, narrow job scope).

Women are still finding it difficult to break the glass ceiling partly due to gender stereotyping in the workforce.

There are four major disruptors identified to be the movement of the changing traditional work environment:

1. Millenials

Will make up 50 percent of the workforce by 2020 and 75 percent by 2025, altering traditional work environments. They do not hang on to one job for too long, as they strive for freedom and flexibility at work place.

2. Technology

Automation, robots, Artificial Intelligence, and applications are changing work and life style. Digitisation has also contributed directly to a decrease in jobs as software replaces some types of work and means that others take much less time.

3. Digital Workforce

Job competition is no longer restricted to the local marketplace. The workforce is increasingly mobile and work can be done from anywhere in the world.

4. Gig Economy

An environment in which temporary positions are common and organisations contract with independent workers for short-term engagements. Freelancers can select among temporary jobs and projects around the world, while employers can select the best individuals for specific projects from a larger pool than that available in any given area.

How will these disruptors affect the global workforce? Due to technological change alone, the human workforce is facing the imminent reality of 2 billion jobs disappearing by 2030. A research study by Oxford University found that 47 percent of all employment (80 million jobs in the US and 15 million in UK) is threatened by **technological unemployment**.

These top disruptors definitely post challenges for everyone in the workforce especially women. After all, women are already currently being marginalised in the traditional work environment with most sectors still struggling with gender parity as well as the prominent lack of female presence in major industries.

Further analysis by the Organisation for Economic Co-operation and Development (OECD) shows that automation is expected to spread across most sectors and occupations, affecting both men and women. Some large industries with high shares of women are at a high average risk of automation; e.g. food and beverage service activities, and retail trade. Women working in education, social work, and health care sectors are faced with lower risk of job automation but are facing a high risk of being displaced in the future.

However, many believe that the ongoing digital transformation will strengthen the position of women in the labour market. More flexible ways of working may make it easier to combine paid work with caring responsibilities, which are still more often taken on by women. Women now are free to work from anywhere, anytime without having to commute to the workplace. At the same time, digital nomadism and telecommuting provide a greater platform for women to network and collaborate globally.

The benefits of flexible working are often focused on improving women's work-life balance, as well as looking after their health and wellbeing. Nevertheless, it is important that careful thought is given on the suitability of different forms of flexible working in the organisation. A poor balance between work and life responsibilities may lead to stress, lower job quality, and higher job turnover among working women. Some managers may also find it difficult to communicate with remote workers and to develop trust within remote team members. If an employer helps their female employees to balance their work and home life, this can be rewarded by increased loyalty and commitment. They may also feel more able to focus on their work and to develop their career.

Bridging the Gap for Gender Equality in Today's Future of Work

The World Economic Forum reported back in 2015 that it would take about 118 years to close the gender gap in terms of labour market opportunity, health, education, and political clout. Other studies have indicated that by incorporating more women into technology sectors, or any sectors for that matter, it is likely to increase productivity and offer women a source of high-quality jobs. In addition, with the involvement of women in technology sectors, the needs of female consumers can be addressed.

How can technology build a more equal world for women and girls? Here are our top five suggestions:

1 Get women and girls involved in the global technology revolution

Increasing women's participation in the technology revolution may ensure an improved and equal future for them. By closing the technology gap, women and girls will have better access to information and able to participate in education, politics, healthcare and working community life.

2 Change the story by celebrating women in leadership

The world needs to acknowledge women's contributions in scientific and technological progress. Their contributions in breaking gender stereotypes and the technological glass ceiling shows that unlimited talents, opportunities, and great discoveries are just within every woman/girl's grasp.

3 Get girls started early

When young women and girls are given full access to technology, they can create technology solutions to issues that matter most to them, and further spread awareness of their basic human rights globally.

4 Get everyone involved

Keeping an open mind towards changes, it is critical to include involvement from every government, leader, organisation, and industry mover and shaker to create a more gender-diverse workforce in all sectors.

5 Find and support Changemakers

Employers and leaders have important roles in changing the organisational behavior and hiring process. Extra efforts must be made to ensure inclusion of everybody, and that hiring and promotion should be based on an individual's capacity/ability; not gender.

What Does the Future of Work Hold for Women?

Just as many studies and reports suggest; a more gender-inclusive political system may lead to better policies for women and girls, and integrating women into corporate boards may mean reaching new consumers, hence resulting into higher profits.

When the potential of women in workplace is suitably tapped, the economy will thrive. When women are given the chance to be the change agent, gender disparity can be eradicated. It is calculated that women could increase their income globally by up to 76 percent if the employment participation gap and the wage gap between women and men were closed. With the combined strength of men and women, business and country can achieve so much more.

The future is being automated as robots and computers are taking over the jobs. Inclusion efforts are more pertinent than ever to ensure no one is left behind. There are hopeful signs that more women are taking the lead in the world of technology. However, keeping this momentum going is not an easy task for all parties. Most importantly, women around the globe must remain optimistic that changes are coming, going in their direction. They just need to hold on tight, and be ready to be inspired to lead the future!

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Riding the Wave of the Future with Youth: The Infinite Possibilities

by:

Norsam Tasli Mohd Razali
norsamtasli@might.org.my

In an ever-changing and challenging world, the future of a nation relies on the next generation. Currently, there are about 1.8 billion young people between the ages of 10-24, the largest youth population in human history, with the majority of these youth residing in developing countries.

In Malaysia, as of 2016, there are more than 5 million youth between the ages of 15-24, making them the third largest group in population. These are the future movers and shakers. Therefore, the importance of their strength, knowledge, and skill is more pertinent than ever.

Youth need to be guided with a variety of plans and equipped with competencies that enable them to face the unprecedented changes that can come from technological, economic, social and political aspects. It is important to explore future opportunities and threats that may affect the future development of youth in any given nation.

But What's Shaping the Future of Youth?

In years to come, the progress of youth development will be driven by a variety of interconnected forces. Transformative forces such as change in population, technology advancement, government policies and personal core values will influence the future of youth employment, education and state of health. Understanding these forces and their impacts on youth development provides great insight of what to expect in the future.

1. **Demographic Change:** The world's population is projected to reach 8.5 billion in 2030, and the number of youth will peak at 1.3 billion. This vast increment in population is driven by urban migrations, advancement in health technology and facilities, as well as stronger family institutions — not to mention an overall improvement in general wellbeing and in the quality of life. This change in demographic population will transform the role of youth and their involvement in further development of a nation.

2. **Economic Growth:** By the year 2030, Global economic growth is expected to continue at approximately 4 percent per annum, with a two-fold increase in Gross Domestic Product (GDP). A change in the global economy will impact an open economy and trading nations such as Malaysia. This in turn will affect the pace of urbanisation, as it will be further driven by urban migration and low mortality rates among urbanites. As one of the biggest populations on earth, young people will be affected by rapid and unplanned urbanisation, causing growth inequalities and job scarcity.

3. **Science, Technology, and Innovation (STI) Ecosystem:** According to Forbes, it is projected that more than 2 billion jobs will disappear worldwide to future technology and automation. As the world is entering its fourth industrial revolution, emergence of Internet of Things (IoT) such as digital systems, networked communications, and large-scale data availability will provide the youth with unlimited information. This revolution will mark new opportunities and challenges for young people to take on. Science and technology will be the leading industries in the future—the syllabi in learning institutions must stay relevant and be STEM and innovative subjects-centric to better equip the youth of the future.

4. **Leaderships & Governance:** As community members become more responsible and self-aware of their roles in community development, there is an increase in volunteerism and non-state actors (the rise of the 3rd sector) to bring changes aimed toward improving a community's quality of life. A successful implementation of policies relies on political stability and improved national security, driven by the 3rd sectors roles. This will be a platform for youth to get involved and be enriched in their leadership roles in the community.

5. **Values:** Malaysia is known for its multicultural and multi-ethnic society, sharing the same principles and values. Future youth must understand that in order to create a happy nation, efforts must be made to achieve a balanced and satisfying life for individuals, family members, and community. The growth of a nation depends on stronger social ties, better-managed commons, and a strong sense of community. Important values are incorporated on all aspects of work and activities, at home and workplace.

Exploring the Future Scenarios for Youth

Understanding how changes affect the above-mentioned drivers is critical to the formulation of proper responses and solutions towards positive growth of the youth. For the purpose of this study, three plausible scenarios have been developed in the perspective of growth, collapse, and transformation of Malaysian youth in the future. The overview of each scenario is explored in three different areas:

Employment: explores any changes of traits influenced by drivers especially on job opportunities, skills and competencies requirement.

Education: explains elements that are related to the education system in Malaysia and how talents are developed.

Healthcare: touches on the physiological and psychological health of youth.

> Youth need to be guided with a variety of plans and equipped with competencies that enable them to face the unprecedented changes that can come from technological, economic, social and political aspects.

Mapping the Future Scenarios

	Growth	Collapse	Transformation
Employment	• Higher employability condition • Higher competencies and skills	• Higher competition for employment • Jobs are more focused and specific towards high level skills	• Self-generating employment • Entrepreneurship becomes a normal choice for career
Education	• Balanced education system with practical and theoretical approach	• Focuses on theoretical development rather than practical and hand on experience	• Education system becomes more open with unlimited access to knowledge
Health	• Healthy lifestyle with higher involvement rate in health activities	• Difficulty to practice a healthy lifestyle	• Able to make self-decision on health and wellness without expert consultation

SCENARIO 1:
The Rise of Youth Qualities
(sustainability lifestyle)

In a thriving environment, youth in Malaysia are living a healthier and a more mindful life. Changes are positively embraced and sustainability living is at the heart of all aspects in life. Young society is more physically and mentally fit, more knowledgeable, more diverse and more inclusive, as well as being equipped with the necessary skills to take on challenges in both school and the workplace.

EMPLOYMENT
Positive economic growth in Malaysia prepares the work ecosystem with high employability conditions. Youth employment is critical to building stronger communities, with a marked need for greater collaboration between educators and employers. Receptiveness towards new challenges and trends such as industrial revolution and technology innovation, will further equip future youth with high competencies and skills that are relevant to the industry's requirement.

EDUCATION
Education is no longer just about learning tangible and measurable skills. Although youth should be prepped in core subjects, it is also important that they be taught how to learn. Malaysia's holistic education redefines pertinent subjects and how youth should be taught making it not just about mental development, but encompassing psychological, social and emotional growth as well.

What they learn in and outside of the classroom is more relevant than ever to meet future industry requirements. Youth have become more practical and relevant as they gain knowledge by doing, not just reading.

HEALTH
Generally, youth population are healthier—physically, mentally, and spiritually. As the education system becomes more holistic, youth are more involved in school activities and programmes that focus on character development. Not only that, having a healthy lifestyle becomes a cool trend where youth strive for positive values, attitudes, and a healthy body image.

SCENARIO 2:
The Collapse in Youth Competencies

A lack of stability in the nation has led to the downfall of quality of life affecting the youth. With limited resources available, sustainability agendas and policies are not effectively implemented, creating tension among Malaysians. The nation is further divided when social values, level of education, and health conditions are declining. Unplanned development has caused many youth to fall through the cracks, making them more incompetent and less educated.

EMPLOYMENT
Job opportunities are scarce, causing high competition rate among youth, with robots and automation taking over human jobs—especially in manufacturing and engineering fields. Globalisation and communication technology advancement have levelled the playing field across the board, forcing local youth to compete with global talent. Job requirements are also becoming more niched, requiring specific skills and knowledge.

EDUCATION
There is not much improvement in the education system that would enhance youth experiences, knowledge, and skills needed to face the future. The education system is too focused on an exam-based format as opposed to the practical, hands-on format. The learning environment has become so rigid that the system often neglects the importance of variety in classrooms such as cultural, social, creative arts, and technology lessons. School becomes a burden to the students as they view it as a rigid learning institution. This will eventually cause a higher rate of dropout, incompetent talents, a low rate of literacy, and an ignorant generation.

HEALTH
With poor education and lack of job opportunities, youth are not able to compete and cope with the fast-changing developments. Mental and physical health becomes a major concern as more youth are struggling to keep a balanced lifestyle. Pollution is rampant, giving way to new diseases spreading among young people.

SCENARIO 3:
Youth Transformation

Technology is the key component towards a positive development. The future of work is being automated in manufacturing, engineering, and communication, among other sectors. With the help of technology advancement, the focus has shifted to a sustainable economy that seeks to preserve limited natural resources due to unplanned development.

EMPLOYMENT
In the twenty-first century, the ease of coordinating tasks enables workers to get more done outside of large organisations. Digital transformation such as Artificial Intelligence and automation creates better adaptable, resilient, and flexible young workers. It rewards highly entrepreneurial individuals who are skilled at finding and assembling resources and coordinating task flows. Combined with innovation skills, a considerable number of youth turn to innopreneurship—a combination of innovative skills and entrepreneurships skills—to gain competitive advantage over their peers and as a foundation to many entry-level work, as well as startups.

EDUCATION
The transformation from the traditional learning education system to a digital literate generation creates an infinite access to knowledge for the youth. With vast information at hand, non-traditional education (a systematic education offered outside the framework of the formal education system) complements formal education to encourage productivity growth among this young population.

HEALTH
Youth are leading the charge by making health-promoting diet and life choices a priority. Today's informed youth are no longer in a purely reactive mode when it comes to their health needs. They are the most willing to take initiative on behalf of their well-being and they become more engaged in their quest for good health, better time management, longevity and independence. Making mindful decisions about a healthy and balanced lifestyle has never been easier for young people with the help of advanced communication technology. Vast information is now readily available with a single click or tap without the help of an expert.

In years to come, the progress of youth development will be driven by a variety of interconnected forces.

Raising Today's Youth For Tomorrow's Hope

It takes concerted, all-out efforts from various stakeholders to unleash the full potential of youth. Government, parents, knowledge institutions, and industry players at all levels must come together to guide and pave positives ways for these future leaders.

To get a glimpse of tomorrow's future, it is critical to anticipate future opportunities and threats, as discussed in three plausible future scenarios for the youth above. Further analysis is required to explore potential opportunities and threats within each scenario. It is hoped that with the right strategies and inclusive policies, the future of youth ecosystem will be secured and preserved for generations to come.

VIEWPOINTS

STEM Education:
Preparing the Future Workforce

by:

Natrah Mohd Emran
natrah@might.org.my

Students of tomorrow are a generation of net-natives that have grown up with smart phones, social media and virtual gaming.

The 4th Industrial Revolution corroborates the advancement of technology, its application, and its impact on almost every facet of business sectors and arenas. However, the level of disruptions, the risks, and the opportunities is different for each field. The impact on employment, for instance, highlights new skills that are required as the work of the future is likely to require more flexibility, agility, networking and inter-connectivity.

The World Economic Forum (WEF) enlisted ten skills for the future of work, which includes complex problem solving, critical thinking, creativity and people management. Therefore, to provide a fully qualified and continuous supply of workers in the workforce, the education system requires some necessary changes.

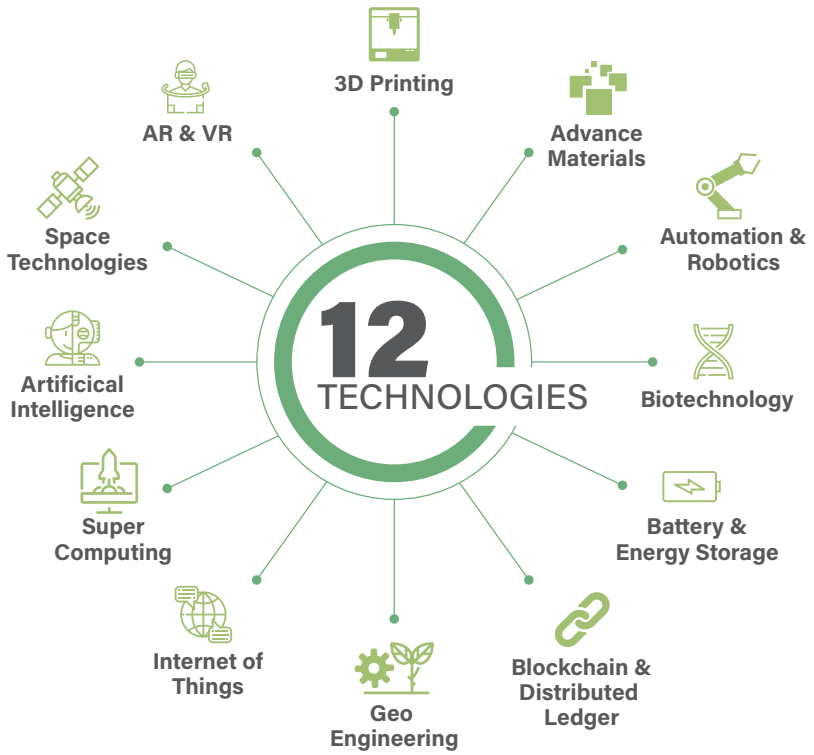
What are the Drivers of Education in the Future?

There are a number of Foresight studies envisioning what the future scenario will look like for education, starting from the early learning programmes up to the tertiary level of educational systems. Changing trends and challenges are observed, among others are; demographic changes, technology advancements at more affordable costs, changing values and culture of the society, an accessibility to an abundance of informative content, as well as required skills and capabilities needed in the future workforce. From the observation, there are four main drivers that will shape the future of education.

1. **Students of the future - their needs and expectations**
   Students of tomorrow are a generation of net-natives that have grown up with smart phones, social media and virtual gaming. These students (including their parents) will expect the pre-school, school and university experience to reflect the real-time, connected nature of the web. This network of *always-on* students (and parents) will want constant access to learning materials and resources, friends, and experts. They will expect personalised and customisable learning environments. As a result, the future of education will be more learner-centered, experiential, immersive and social.

2. **Changing of teaching delivery**
   Accessibility to information, artificial intelligence (AI) and mobile devices will impact the future teaching and learning. For instance, routine academic tasks such as grading assignments, can be automated with the help of AI. For most people today, pedagogy (which refers to a strategy or style of instruction) conjures up an image of a packed lecture hall or a classroom tutorial. These developments will mean that entirely new forms of pedagogy will be made possible in the future. These will be radically different from the way that education is delivered today, effectively providing more

12 Enabling Technologies of the 4th Industrial Revolution



appropriate learning strategies than those employed currently. Teachers and lecturers will not be the only source of knowledge like the old days but will become more of a source to verify the acquired knowledge from various resources.

3. **Physical facilities and learning environments**
Educational technology is improving rapidly—high-quality online content is exploding, and the supporting infrastructure, such as cloud computing and mobile devices, is growing. The ability to connect students with remote, high-quality instructors multiplies these factors. To compete with virtual spaces such as online platforms and web-based environments, physical learning environments will have to provide benefits that go beyond face-to-face access to people.

Classrooms, schools, or universities will have to be places where students genuinely want to spend time. Compelling reasons might include access to specialised facilities such as *smart* classrooms and lecture theatres, or access to high-quality, healthy food at affordable prices.

4. **Skills needed by future employers**
In a world dominated by information and the analysis and interpretation of data, future employees will need to be able to process complex information as well as effectively solve problems. They will also need important intangible or *soft* skills. The ability to adapt to new situations, generate new ideas, engage with others and solve unexpected problems is crucial in the knowledge economy. Soft skills become even more important as technical work is increasingly handled by computer. Listening, relationship-building and creative collaboration are all skills that will be much in demand, all of which depend on effective communication between people.

According to WEF, creativity will become one of the top three skills workers will need. With the avalanche of new products, new technologies and new ways of working, workers are going to have to become more creative if they are to benefit from these changes. Robots may help us get to where we want to be faster, but they cannot be as creative as humans.

Role of STEM

However, currently in Malaysia, the percentage of students in the science stream is far less compared to the percentage of those in the arts. It is estimated that STEM professions will represent 75 percent of the workforce by 2025. Dominant future workforce profiles will include highly qualified engineers from emerging economies, tech-savvy individuals from the Facebook Generation and employees who work well past the current retirement age. The result will be a workplace characterised by hyperdiversity, where people from different cultures and generations, with different beliefs and requirements, share spaces and work together.

Thus, it is inevitable that science, technology, engineering and mathematics (STEM) will be critical subjects in the industrial revolution and in preparing the future workforce. In the future, there will be a hike in demand for technology literate workers, to make, manage, and maintain the technology. STEM professionals are tasked with solving the complex problems of today's world and its future. They are working to find solutions for global

The potential for technology to transform education has been touted for decades, yet the field has resisted technology adoption.

warming, cancer, third world hunger, disappearing habitats, and an interdependent world economy.

Yesterday's stereotype of the *geek* in a lab coat is not representative of today's STEM teams, where economists work with researchers on technical transfer and engineers build the state-of-the-art equipment for businesses working with cutting-edge technologies.

Conclusion

The potential for technology to transform education has been touted for decades, yet the field has resisted technology adoption. Technological advances are accumulating, with cycles of innovation becoming more rapid, equipment more affordable, and students more tech-savvy. After all, technologies must be embraced fully. Technology needs to drive strategy, and not merely be an add-on.

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VIEWPOINTS

Universal Basic Income

A Revival of a Centuries-old Idea

by:

Mohd Hasan Mohd Saaid
hasan@might.org.my

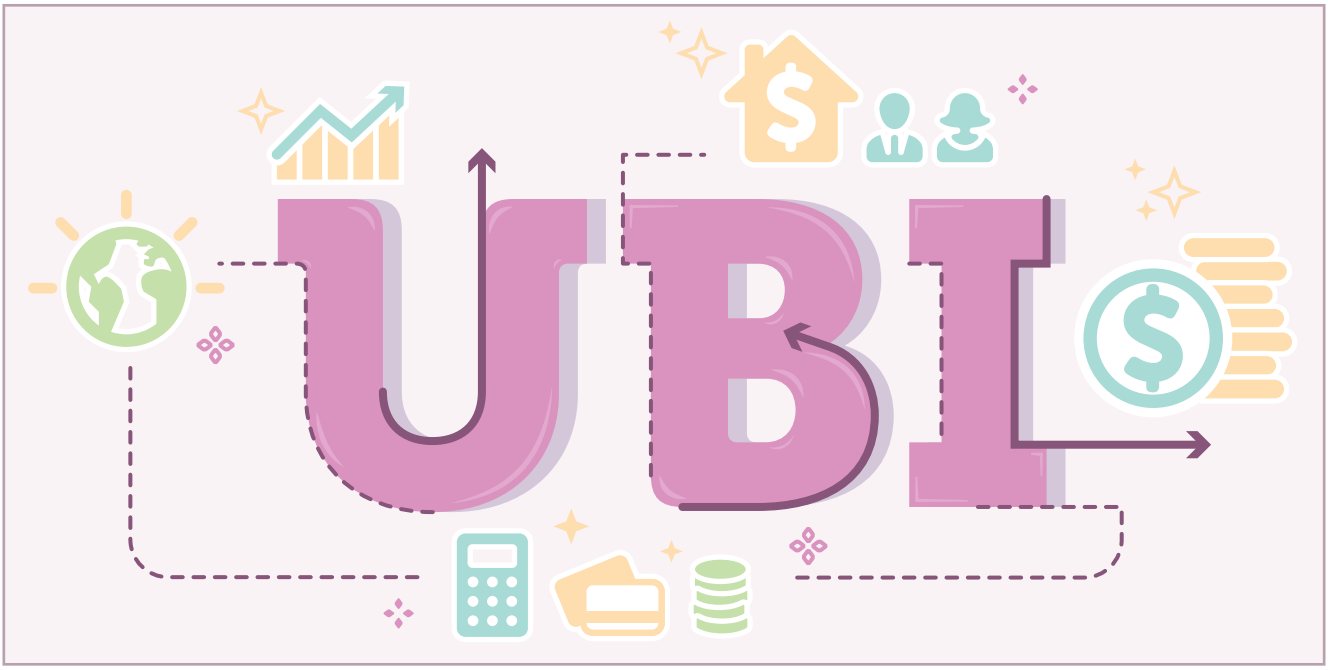
Unconditional or universal basic income, or UBI has been getting renewed interests and attention in recent years.

As automation technologies take over tasks previously performed by humans, their potential effect on employment and wages is becoming a major focus of research and public concern. Where machines could replace humans, the question arises—how do we help people most affected by automation? A highly cited study by Oxford University academics estimates 47 percent of total U.S. employment is in the high risk category where associated occupations could be automated relatively soon, perhaps over the next decade or two. Billionaire entrepreneur Elon Musk, while speaking at the World Government Summit in Dubai earlier this year, warned that a universal **basic income** will become necessary as people's jobs are increasingly replaced by robots.

Unconditional or universal basic income, or UBI has been getting renewed interests and attention in recent years. Universal basic income is an approach to economic security in which a fixed amount of money, at a level sufficient for subsistence, is given by the government to all its citizens regardless of income or work status, no strings attached. This idea is not new; in fact, basic income has far older roots, dating back to the 16th century when the idea of a minimum income first appeared. At the end of the 18th century, the idea of an unconditional one-off grant first appeared. And the two were combined for the first time to form the idea of an unconditional basic income near the middle of the 19th century.

Between 1968 and 1980, the U.S. Government experimentally tested a version of basic income. The debate died down without a clear consensus on what the results of the experiments implied for policy, although the results continued to be cited as evidence for the viability or the non-viability of a guaranteed income both by its proponents and opponents. Meanwhile in Canada, between 1974 and 1979, a field experiment on guaranteed annual income called MINCOME was conducted in Dauphin, a small farming town in the province of Manitoba. The results suggest the safety net could carry social benefits that save money in the long term—a majority of the participants kept working, teenage children stayed in high school longer, and hospitalisations fell significantly, especially for mental health problems.

Later, in 1982, Alaska implemented its own brand of basic income called Permanent Fund Dividend (PFD) which is derived from earnings on investment of the Alaska Permanent Fund (APF), a portfolio of diversified assets. Since market fluctuations affect APF investments, the size of the annual payment fluctuates from year to year. Notably, the dividend is one contributing factor to the decline in Alaska's poverty rate, particularly among the Native Americans. The Native American poverty rate fell from 25 percent to 19 percent between the census years of 1980 and 1990. A study of the early dividend program in 1984saw only 1 percent of Alaskans surveyed



reported they worked less because of the dividend.

Full UBI experiments have been carried out more recently in places such as Namibia, India and Brazil. Other countries and organisations are following suit experimenting with UBI in varying degrees. In Finland, a basic income experiment is currently being conducted among 2,000 persons between ages 25 and 58 selected at random, who will receive a monthly basic income of 560 euros for two years (1 January 2017 - 31 December 2018). The experiment is carried out by Kela—Finland's Social Insurance Institution. The purpose of the study is to examine the impact of basic income. One of the topics studied is whether there are differences in employment rates between those receiving and those not receiving a basic income. Proposed social assistance experiments in Netherlands, in several Dutch municipalities, are still under review by the Dutch Ministry of Social Affairs. However, these experiments will not test a full-fledged basic income but rather the effects of reducing conditions on welfare benefits. Canada's province of Ontario started a pilot programme in April that provides 4,000 low-income residents with an unconditional income; the level of support comes up to just under 17,000 Canadian dollars per year, less 50 percent of any income they earn. A nonprofit organisation called GiveDirectly have launched the world's first true universal basic income experiment. The 30 million U.S. dollar programme will distribute an unconditional monthly benefit to 6,000 people in sub-Saharan Africa, and it will last ten to fifteen years.

Proponents of UBI say the aim is to give workers greater financial security as concerns rise about machines taking away jobs. The most substantial benefit would be the elimination of households living below the poverty line, which would afford everyone a base level of income security. Dutch journalist Rutger Bregman when speaking about basic income at TED2017 in Vancouver, did not frame basic income as a response to technological unemployment. Instead, he argued that poverty simply results from a lack of cash, and that the best way to end poverty is just to give money to the poor. Many believe it will also result in an explosion in creativity, entrepreneurship, and research—a notion supported by billionaire founder of Facebook Mark Zuckerberg. He said people think and work differently when they have their basic needs met, and having that allows and encourages creativity and innovation.

Proponents of UBI say the aim is to give workers greater financial security as concerns rise about machines taking away jobs.

Many opponents of UBI believe an unconditional benefit would disincentivise productivity and work, though early experiments have shown these concerns are unsubstantiated. Some argue a global benefit could result in inflation. Then there is the critical point of how it would be funded, and the feasibility of governments to afford UBI in perpetuity. Due to the inherent scale of a universal income, funding would have to come from a variety of sources, extending beyond taxing incomes to methods of taxing forms of wealth including, but not limited to, land-value taxation, transaction taxes, carbon taxes, natural resource royalties, and taxation of corporate stock.

A new study by the Organisation for Economic Cooperation and Development (OECD), released in June this year, concluded that at current spending levels, a basic income would be well below the poverty line. Correspondingly, a basic income adequate to reduce poverty would require substantial increases in taxation. Even in the latter case, the risk of poverty might actually increase, as people lose their existing benefits in favour of UBI. Their conclusion is based on analysing the effects of a scenario in which all existing cash and tax benefits for those under 65 would be converted into a UBI in 35 OECD member countries. Based on the findings, OECD suggested a *partial* basic income could be an option—instead of replacing existing benefits, introduce basic income as an additional transfer, or make basic income available only for a certain number of years during an individual's lifetime, maybe with restrictions.

As the world stands on the brink of the Fourth Industrial Revolution, we need to explore innovations in policies to ensure the sustainability of social security systems, and the distribution of income. Certainly, the concept of universal basic income is going to be debated and discussed over the next twenty to thirty years as this evolution takes place. The scope of discussion has been not only about wealth redistribution as a response to mass automation but also about how modern societies can continue to create jobs while pushing technological advances such as burger-cooking robots, tax preparation artificial intelligence platforms, and driverless trucks.

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UBI FUN FACTS

1 The idea of a minimum income first appeared in the 16th century, while the notion of an unconditional one-off grant came to light at the end of the 18th century. The two were combined for the first time to form the idea of an unconditional basic income near the middle of the 19th century!

2 Among the countries that have tested versions of UBI; USA, Canada, Alaska, Namibia, India, Brazil, Finland and Netherlands.

3 Many believe it UBI will result in an explosion in creativity, entrepreneurship, and research. Founder of Facebook Mark Zuckerberg said people think and work differently when they have their basic needs met, and having that allows and encourages creativity and innovation.

4 A field experiment in Canada shows promising result—a majority of the participants kept working, teenage children stayed in high school longer, and hospitalisations fell significantly, especially for mental he

VIEWPOINTS

The Freelance Economy:
The Expanding Pool of Contract Workers

by:

Azmil Mohd Amin
azmil@might.org.my

The rise of the gig economy may be a key indicator of the future of work, notably in terms of collaboration practices.

The Rise of Independent Workers

Whether freely choosing to work independently or forced to do so by economic circumstances, the number of freelancers in the workforce is steadily rising. A McKinsey study conducted in 2016 found that between 20 percent and 30 percent of the labour force in both the US and the EU-15 (the first fifteen members of the European Union) is comprised of independent workers (self-employed or temporary). According to the study, the governments on both continents have seriously undercounted this population, in particular by ignoring those who do independent work to supplement their income. In Europe, freelance workers consist of a sizeable share of the workforce.

Known as the gig economy, this category of the workforce comprises those performing contract work, freelance work, and work sourced from online marketplaces. It is now rapidly growing globally and will likely continue to do so throughout the next decade.

The rise of the gig economy may be a key indicator of the future of work, notably in terms of collaboration practices. It represents a major change in the nature of work and in the ways of both working and hiring—a shift from working for a single employer to working for clients, and from hiring full-time employees to contracting skilled workers on a project-to-project basis. Although freelancers essentially work for themselves, they offer their skills, know-how, and expert services to a range of different organisations. The rise of freelance independent professionals—highly skilled self-employed individuals—provides added value, flexibility, and innovation to both individual businesses and national economies.

Malaysia sees the country's gig economy as an opportunity to increase productivity by hiring unemployed citizens to work at flexible part-time jobs. The Malaysia Digital Economy Corporation (MDeC) has set up several initiatives to get underemployed Malaysians onto gig economy platforms namely eRezeki and eUsahawan. Malaysia's neighbouring countries, Singapore and Taiwan, are seeing huge changes in their gig economies as well. In Singapore, a new labour association was founded in May 2017 to protect drivers under the ride-sharing apps, and the Singapore Workforce Development Agency has launched initiatives to help freelancers look for jobs and keep their skills relevant.

Key Drivers

The explosion of the gig economy is being driven by a variety of interconnected forces.

- **Corporate cost control measures.**
  Under increasing pressure to reduce overhead especially labour costs, many companies have downsized in recent years. As a result, especially during high-demand periods, organisations sometimes find critical gaps in their work pool. To minimise these gaps, many are turning to independent workers. Freelancers offer companies greater resource flexibility, and therefore greater competitive advantage—allowing them to deploy expert skills as needed, at a considerably lower cost than full-time hires. For many companies trying to control costs, it makes economic sense to power up and power down staffing based on projects. In this manner, companies can meet the needs of individual projects more efficiently, rather than engaging long-term (and then either underutilising or laying off) full-time employees.

- **Lifestyle benefits.**
  One of the primary draws of freelance work involves scheduling flexibility—being able to work when one wants in whatever ways possible. The ability of freelancers to manage their own time can contribute significantly to their overall well-being. Indeed, 78 percent of adults in the UK believe that freelancing and flexible working can help promote a good work/life balance and nearly as many (72 percent) believe it has a positive effect on family life.

- **Independence.**
  For successful freelancers, working independently gives them more control which allows them to be more agile in a rapidly changing world. And a 2016 ReportLinker survey found that 28 percent of freelancers cite the freedom of *being your own boss* as the top reason to freelance.

- **Ability to work at home and from almost anywhere.**
  Nearly half of freelancers work from home, making the need to commute to workplace non-existent and allowing flexibility of scheduling. In addition, surveys of those who use co-working spaces have found that 54 percent describe themselves as freelancers. The Internet has in large part-erased the effects of distance and the need for in-office collaboration. Modern technology such as smartphones, tablets, and laptops is making it possible for freelancers to work anywhere. Ample software exists to enable teams working from different geography to work together towards same goals.

- **Job satisfaction.**
  A 2014 report by MBO Partners on independent workers found that 82 percent reported satisfaction with their work situation, while 76 percent planned to stay independent in the future. In addition, 59 percent strongly agreed that they found real purpose in their job (compared to just 40 percent of non-independent workers).

- **Economic benefits.**
  Even those who do not freelance fulltime overwhelmingly see the appeal of earning more through side gigs. In 2016, 80 percent of non-freelancers in the US said they would be willing to have a part-time job or work other than their primary job in order to obtain higher income. In addition, those in unstable employment situations are particularly open to the possible economic benefits of freelance work. The ReportLinker survey found that 59 percent of part-time workers and 39 percent of job seekers would consider freelance work.

Freelancers offer companies greater resource flexibility, and therefore greater competitive advantage.

- **Social acceptance.**
  While *freelance work* was once looked upon as a euphemism for unemployment, acceptance of freelancing as a valid career path is growing. An overwhelming 87 percent of UK university students see freelance work as a highly attractive and lucrative career option and 29 percent of graduates include freelancing as part of their career strategy over the next five years. The appealing elements offered by the gig economy such as freedom, flexibility, and independence are drawing the job seekers to voluntarily become independent workers and many workers in traditional jobs (or unemployed) also wish they could do more flexible, self-governed work.

The Downside of Freelancing

Although the overwhelming majority of those who have chosen freelance work are content with their choice, freelancers also face unique challenges, difficulties and hardships. While workers who choose to go independent and find freelance gigs contribute significantly more autonomy over their work lives, many do so at the cost of employment security. For freelancers, work beyond this gig is seldom guaranteed—although a 2014 survey found that many freelancers report having multiple work streams at the same time, diversifying their income sources, thereby achieving greater economic stability. With no steady guaranteed income, most freelancers need to possess entrepreneurial skills in order to do their work—marketing themselves, finding gigs, negotiating contracts, invoicing and securing payments.

Keep in mind that the picture is not all always rosy. Some independent workers happily choose to work freelance, while others are forced to endure contract work due to unemployment or financial necessity. This would influence their feelings about their position in the gig economy. It also reflects the different skill levels and socioeconomic realities that differ between the gig economy participants.

In Malaysia, the gig economy is rising at a faster pace than the traditional job market which means individuals who seize work opportunities in that category are often left out from social security coverage due to absence of regulation. The growth of the gig economy has increased by 31 percent this year, surpassing the traditional jobs' workforce. The Employees' Provident Fund (EPF) has called on the government to increase its contribution to the 1Malaysia Retirement Savings Scheme (SSP1M) as a means of bolstering the participation of Malaysians who are engaged in the **gig economy**.

Business and Policy Implications

The rapidly expanding freelance economy will continue to drive change in both the way work is done and in the way companies and workers interact. Over the next decade or more, companies will likely contract with more freelancers as a means of efficiently handling fluctuations in their staffing needs, creating more and more opportunities for skilled freelance workers.

However, the unique needs of freelance workers still need to be addressed. The more the gig economy workforce grows, the more support services such as tax withholding, health insurance and retirement savings will become pertinent. These unmet needs may create opportunities for both start-ups and established players.

Insurers might pool freelance workers, for example, to provide a wide variety of insurance protection. Investment counsellors and other financial professionals will be needed to set up retirement and pension plans that serve the distinctive work situation of freelance workers.

In addition, those who want to turn to freelancing as the model continues to become more widespread may realise that they need to acquire new skills or refresh old ones. This will heighten the demand for programmes that provide such instruction—especially those that offer skills training remotely.

A growing gig economy and tax system that rewards self-employment could hit the government's coffers. Take the U.K for example. Jobs created by the likes of Uber and other gig economy mainstays flatter Britain's unemployment rate, and have helped to smooth out the worst effects of the financial crisis. However, the less pleasant implications of a surging gig economy are now dawning on the government, where a lessened regular workforce exposed a potential 3.5 billion pound gap in tax receipts by 2022.

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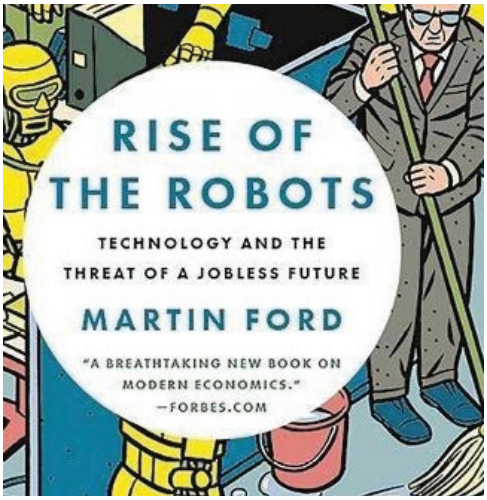
Machine, Platform, Crowd:
Harnessing Our Digital Future

ISBN-10 : 0393254291
ISBN-13 : 978-0393254297
Author : Andrew McAfee, Erik Brynjolfsson
Publisher : W. W. Norton & Company

We live in strange times. Andrew McAfee and Erik Brynjolfsson, the authors of the 2014 bestseller *The Second Machine Age*, bring an amalgamation of several fields to present a practical guide to the changes and disruptions brought by the technological progress of the times.

MIT's McAfee and Brynjolfsson know what it takes to face this digital-powered shift head on—We must rethink the integration of minds and machines, of products and platforms, and of the core and the crowd. In all three cases, the balance now favours the second element of the pair, with massive implications for how we run our companies, and live our lives.

Machine, Platform, Crowd: Harnessing Our Digital Future is an essential reading for every executive, entrepreneur, investor, policymaker and anyone else interested in building and supporting a successful organisation in these strange times of progress and turbulence.



Rise of the Robots:
Technology and the Threat of a Jobless Future

ISBN-10 : 0465097537
ISBN-13 : 978-0465097531
Author : Martin Ford
Publisher : Basic Books

As technology continues to accelerate and machines are invented more capable to take care of themselves, the workforce will be needing fewer and fewer people. The questions remain—What are the jobs of the future? How many will there be? And who will be holding them? *Rise of the Robots*, like many of its predecessors—notably Jeremy Rifkin's *The End of Work* (1996), among others—examines the effects of accelerating technology on the economic system.

The invention of the first machines did come with the concern about their effect on work and on people, and now as computers and machines become more capable, powerful and sophisticated, the level of anxiety and to an extent, angst, have also risen. Martin Ford, a Silicon Valley futurist surmises that, "Artificial intelligence is already well on its way to making even good jobs obsolete. As progress continues, blue and white collar jobs alike will evaporate, causing massive unemployment and the implosion of the consumer economy itself."

This book is a must read for anyone who wants to understand what accelerating technology means for their own economic prospects—not to mention those of their children—as well as for society as a whole.

MITI's TN50 Townhall: Let's Talk Futures

MITI, Kuala Lumpur

25th July 2017

"The future is not linear.
The future is not like today.
The future is not utopia."

At MITI's TN50 Townhall, MIGHT-myForesight® delivered these three clear key messages to prepare Malaysia for the future. According to MIGHT-myForesight, it is critical to inculcate systematic forward thinking in exploring the futures, including the intention of what to aspire for Malaysia 2050.

Foresight allows us to think systematically about the future to inform decision-making today. Observing the trends, identifying future drivers, and exploring plausible scenarios will definitely help to paint the aspirations of Malaysia 2050 more realistically.

Foresight and Futures Thinking: Provocateur to Innovation

MaGIC, Cyberjaya

13th July 2017

Foresight is about changing your mindset towards having a broader view about the futures. However, being a Future-proof entrepreneur requires you to be not only more than innovative, but also able to systematically look at the Future, to understand the Future needs, as well as to organise a long term thinking process.

MIGHT-myForesight® shared the insight on how Foresight and Futures Thinking as the Provocateur to Innovation during the MaGIC Grill or Chill session to about 50 young entrepreneurs. The one-hour session introduced Foresight tools and methodologies and explored the questions of trends versus fads, and turning future threats into opportunities.

Preparing the Future of Workforce

Sekolah Menengah Teknik Kuala Lumpur, Cheras

5th July 2017

The session at Sekolah Menengah Teknik Kuala Lumpur in Cheras, talked about the future of jobs to 600 Form 4 and Form 5 students. The Career Talk session aimed to expose them with some futures mind-set and to provide guidelines in shaping their carrier pathways.

With proper skills, knowledge and capabilities in facing the era of the 4th Industrial Revolution, competitiveness is vital. In the future, the workforce is required to have different sets of skills to thrive in the technologically-rich, globalised and competitive job markets.

Industry 4.0: Are we Ready?

MITI, Kuala Lumpur

19th June 2017

The imminent rise of artificial intelligence and the robotisation of our daily life—such as the use of 3D printing—, the dominance of big data as well as internet of things have resulted through the 4th Industrial Revolution. This topic is no longer new in Malaysia, as most industries have started talking about it, especially by those who are heavily affected by this revolution.

MITI recently organised a half day seminar on Industry 4.0 targeting its officials. MIGHT, through En. Rushdi Abdul Rahim, was invited as one of the speakers, to set the scene of where Malaysia is currently in the scheme of the 4th Industrial Revolution and its implications. Given that this industrial revolution is a game changer, it would generate profound political, economic and social changes.

The aim for this engagement and awareness is to address how governments are to prepare, manage, and respond to the developments associated with the 4th Industrial Revolution. Additionally, what will the government of the future look like and how will it fulfil and deliver its core functions.

Future Energy @ TNB

Cyberjaya

16th April 2017

The 4th Industrial Revolution will impact every individual, government and industry by advances in technology. We are now living in a time of unexpected changes that will influence the way we lead our life, including culture. According to the World Economic Forum on ASEAN 2016, in the past 50 years, 60% of the earth's ecosystem has been depleted and natural-resource consumption is expected to rise by three- to six-fold by 2050. We need to understand and anticipate risks and opportunities of the future.

In order to establish a guideline on how we can mitigate our future, MIGHT and its lead member TNB had a session to explore future strategic collaborations. The session started with a brief introduction from myForesight®, followed by an open discussion on foresight activities and capacity building. MIGHT was represented by Programme Directors Mohd Nurul Azammi Mohd. Nudri, Azmil Mohd. Amin and Mohd Hasan Mohd Saaid.

Foresight Pilot Test @ MAMPU

Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), Putrajaya

26th – 28th April 2017

On the 26th to 28th April, MAMPU organised the pilot session for their **Development of Public Service Transformation Circular (PTPA) and Scenario Planning Implementation Guideline** as part of **myForesight's Strategic Thrust 2: Building National Capacity in Foresight & Futures**.

This was a kick-off session since the last knowledge transfer from myForesight® to MAMPU (date). The full hands-on session was attended by MAMPU officers for them to learn applying the Foresight tools and methodologies within the organisation.

How the world of work is changing

Here are just a few ways the world of work has changed, and continues to change.

The workplace of today looks dramatically different to that of a few decades ago. Social, technological and environmental changes mean that the workplace has had to adapt to keep up with the times.

The Job hunt

The internet has transformed how people search, network and apply for jobs. The saying it's not what you know. it's who you know' is now truer than ever, as referrals and networks play an increasingly important role in the search.

1973
Britain's Labour Exchange, set up in 1910 is renamed **Jobcentres**

Pre 1990s
Jobs were found using
Local newspapers
Vacancy signs in shop windows
Networking

1995
CareerBuilder launched

1994
Monster.com founded

2013
Linkedin celebrates 10 years with 225m members

Today
Video chat breaks down geographical boundaries and lets job seekers 'attend' more interviews

Today
"Hire for culture, train for skill" - 25% of employers state that cultural fit is more important than skills

?
Linkedin have developed an **economic graph** in which there is vision to create economic opportunities for the world's workforce

Today
It's now commonplace to complete an **online application or phone interview** before a job hunter and recruiter meet in person

Today
Employer brand is an important tool for attracting the right talent - **80%** of organisations consider their employer branding to be successful

Today
Employers can check candidates' **social media** to screen hires and job seekers can use social media to find jobs

1970s | 1980s | 1990s | 2000s | 2010s | Future

Roles at work

Market pressures and technological advances mean that roles and responsibilities in the office have changed too. Today, leaders are focused on aligning company mission, culture and brand to engage customers and employees.

1980s
As **computers take over typewriters** new roles and job tities such as IT managers are created

2004
DuPont becomes the first public company to have a **Chief Sustainability Officer (CSO)**

2005
Brands start using **Forum Moderators** - the first step in social media marketing

2012
'intraprenuership' is on the rise - individuals who act like entrepreneurs while working at big companies

2020
It's estimated **50%** of the US workforce will be **freelancing**

1980s | 1990s | 2000s | 2010s | 2020s

1980s - 2000s
The group of managers reporting directly to the CEO double from **5 to 10** positions

Some new management roles include:
Chief Marketing Officer
Chief R&D Officer
Chief HR Officer
Chief IT Officer

2010
Empowering employees is seen as becoming increasingly important despite **82%** of workers saying they haven't established career goals with their supervisors

Today
Traditional hierarchical structures are changing to more flat/circular systems allowing for more **openness from management** and **input from all employees**

There is now **more generational diversity** as Baby Boomers Gen X and Gen Y work together

Demographic changes

As traditional gender roles breakdown, workplaces have slowly started to see a more balanced representation of genders in certain fields.

1970 UK introduces the **Equal Pay Act** - employers must give men and women equal treatment in terms of pay and conditions

Percentage of men **who work** around the world

1996 52% women 80% men

2012 50% women 77% men

1972 Katherine Graham becomes the **first female CEO** of a Fortune 500 company

2010 In the UK, the **State Pension Age for women** increases

2013 **20% of board members** in the FTSE 250 are female

1970s | 1980s | 1990s | 2000s | 2010s | Future

1977 Employees who believe **men should earn more money** and women should stay at home — 64% / 39%

2008

2012 The **gender pay gap** is 19.1%

? It's believed emerging economies will be **less bound to traditional hierarchies** of today's big companies

Communication

Technology has brought about plenty of changes in the office: from how things are communicated to how data is stored.

1966 Xerox sells the **Telecopier** - the first successful fax machine

1980s Typewriter desks disappear as **PCs become the equipment of choice**

1983 Time Magazine names the **computer as "Man of the Year"**

2003 First beta version of **Skype** is released

67% of organisations claim **spam email** distrupts their daily operations and business

2014 **Wearable devices, holography in virtual doscussions and instant translation streaming** are some tech advances that may shape the office of tomorrow

2015 60% of workers say they would leave their jobs if their ability to do **personal tasks** at work

?

1960s | 1970s | 1980s | 1990s | 2000s | 2010s | Future

1971 The computer **floppy disc** is invented

1981 The **laptop computer** is introduced

2012 **iPhone** and **Android** surpass BlackBerry in corporate sales

2013 4m businesses and **97%** of Fortune 500 companies use **Dropbox**

2019 It's estimated there will be **24bn** devices connected to the **Internet of Things**

The Office

From suits and cubicles, to hoodies and open plan offices. For certain sectors, workplaces have become at lot more relaxed.

1960s The 'office-landscape' a type of **open office-planning**, is imagined by Eberland and Wolfgang Schnelle

2014 According to a SHRM survey, **some perks** that business offer

- 20% Free snacks and beverages
- 4% Electric vehicle charging stations
- <1% 'Divorce insurance' (<1%)

2007 Smoking in enclosed work places is **banned**

2005 **'Coworking'** is first used to describe a physical working space unique from the corporate office

Today People are now **working longer** than they used to with the average age of retirement rising

1960s | 1970s | 1980s | 1990s | 2000s | 2010s

1968 Robert Propst designs the **cubicle' office** set up

1997 A survey finds **93%** of office cube dwellers would **prefer a different workspace**

2015 Big organisations such as Apple, BBC and Google adopt **collaborative office designs** where running into people and having chance meetings are more key than having a desk

Work outside the office

For some, technology has made it possible to work anywhere, anytime and with anyone. Companies who advocate teleworking say it cuts costs while allowing them to compete for wider talent pools.

Many employees juggle work-life balance. Off the clock emails and quick calls to colleagues leave the boundaries between work and personal life blurred.

1973 **'Telecommuting'** comes into public attention in the US

Percentage of the UK workforce that are **teleworkers**:

1997 4% **2005** 8.5% **2007** 8.9%

2013 **aDesk** and **Elance** merge to have a combined **8m** freelancers and **2.5m** businesses

1970s | 1980s | 1990s | 2000s | 2010s | 2020s

2013 Though **Yahoo** famously **bans working from home** research shows that giving workers flexibility allows for greater productivity and happier employees

2022 Outsourcing or contracting work will be on the rise: according to a PwC report **20%** of the workforce will be made up by **contractors** and **temp workers**

Many jobs being filled today didn't exist 20 years ago - and it's expected that in 10 years time, 60% of jobs will be completely new for their time.

How will your role look to future generations?

For the sources behind this infographic, please visit:
www.nextgeneration.ie/sources-world-of-work-is-changing

NextGeneration Recruitment

Map The Future

As a strategic policymaker or stakeholder, you can help map out a desired future for Malaysia

This is an invitation by **myForesight** to build a collective future. Do you find this magazine thoughtprovoking? Do you think we could have done better? Perhaps you would like us to cover a specific angle in the study of Foresight.

Or maybe, you would like to contribute articles to **myForesight** magazine? Send your feedback and articles to foresightinternal@might.org.my

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We look forward to hearing from you.

myForesight team