ABU DHABI
SUSTAINABILITY WEEK

ADSW FUTURE SKILLS 2030 REPORT

YOUTH 4 SUSTAINABILITY

FOREWORD NOTE

For young people preparing for college, choosing a degree can be a daunting task. And with the onset of new digital revolutions promising to transform job markets, making that all-important decision is becoming even harder. Yet, it is equally true that change gives rise to new and exciting opportunities.

Evolution invariably has both winners and losers and demands that we leave our comfort zone. Consider the experience of the typical American worker over the last century and a half. In the second part of the 1800s, over half of the US workforce was still employed in agriculture. The start of the 1900s witnessed the onset of the mass production line, symbolized by Henry Ford's iconic Model T Ford. The post-war period then ushered-in the age of electronics and computers, bringing along global brands such as Apple, Microsoft and Facebook. Today, the post-millennial generation is witnessing another period of upheaval widely described as the Fourth Industrial Revolution, in which the once clear dividing lines between our physical, digital and biological worlds are starting to blur.

Every technological shift produces an equally dramatic reaction in job markets. But in more recent times, these seismic changes also threatened the health of our climate and ecosystems, as a growing middle class exerts an unsustainable demand for energy and natural resources.

The United Arab Emirates was the first oil-producing country and OPEC member to sign the Paris Accord, and has been at the forefront of efforts to mitigate global warming. As a tangible evidence of its commitment to incubate a commercially viable renewable energy and sustainability sector, the United Arab Emirates established Masdar, the Abu Dhabi Future Energy Company, in 2006, then launched World Future Energy Summit (WFES) in 2008 followed by Abu Dhabi Sustainability Week (ADSW) in 2013. Although a global platform, ADSW brings considerable focus on the challenges confronting the Middle East & North Africa, home to a rapidly growing and urbanizing population, dramatically rising energy demand, and acute water shortages.

Without question, sustainability topics are more pressing than ever on the global policy agenda because of stronger awareness of the public, particularly among the youth. At the same time, digital innovation is increasingly empowering industries to get involved. Therefore, ADSW is widening its focus beyond renewable energy this year. From 2019, what is now one of the world's largest sustainability gatherings is taking place on the six pillars of energy & climate change, water, mobility, space exploration, biotechnology and food & agriculture.

FOREWORD NOTE

Our sustainability landscape is changing so rapidly that job markets are still trying to catch-up. Inevitably, tomorrow's school and college-graduates will be those designing and filling job roles that are yet to be created. So at ADSW 2019, we're launching the FutureSkills 2030 initiative to further raise sustainability awareness among our youth, and to help our young people adapt to the changing demands of the world of work.

Young people planning their careers need to focus on four critical areas: gaining the most relevant educational background, developing soft skills, acquiring a professional network, and continuously learning and adapting.

This report will explain the dynamics that are causing the Jobs markets to change over the next decade, while addressing critical questions such as: How can young people compete with smart technologies in the workplace? Which skills will be the most important to succeed? And what job roles and sectors are likely to become the most sought-after in the future?

Based on extensive critical analysis of new and existing peer-reviewed research, the following infographic report lays-down expected job market trends and skills insights. It will shed light on the first two areas in particular: soft skills (including creativity, innovation, team-building, and emotional intelligence) and educational build-up (academic and vocational skills that may be of greatest relevant to future employers).

With so much uncertainty ahead, a well-informed guidebook may be very handy. This infographic report is intended to help young people demystify the jobs market of the future and assume greater control over the direction you want to drive your career towards.

5 Driving Forces Shaping the future of jobs & skills

1 Rapid technological progress

Robotics, automation & advanced manufacturing

Artificial intelligence

Virtual Reality
Augmented Reality

Big data & advanced analytics

2 Drive towards sustainability

Climate change

Resource scarcity

3 Socio-demographic shifts

Increasing longevity

Diversity at work (inclusion)

4 Personal purpose & responsibility

Spirit of purpose

Ethics & citizenship

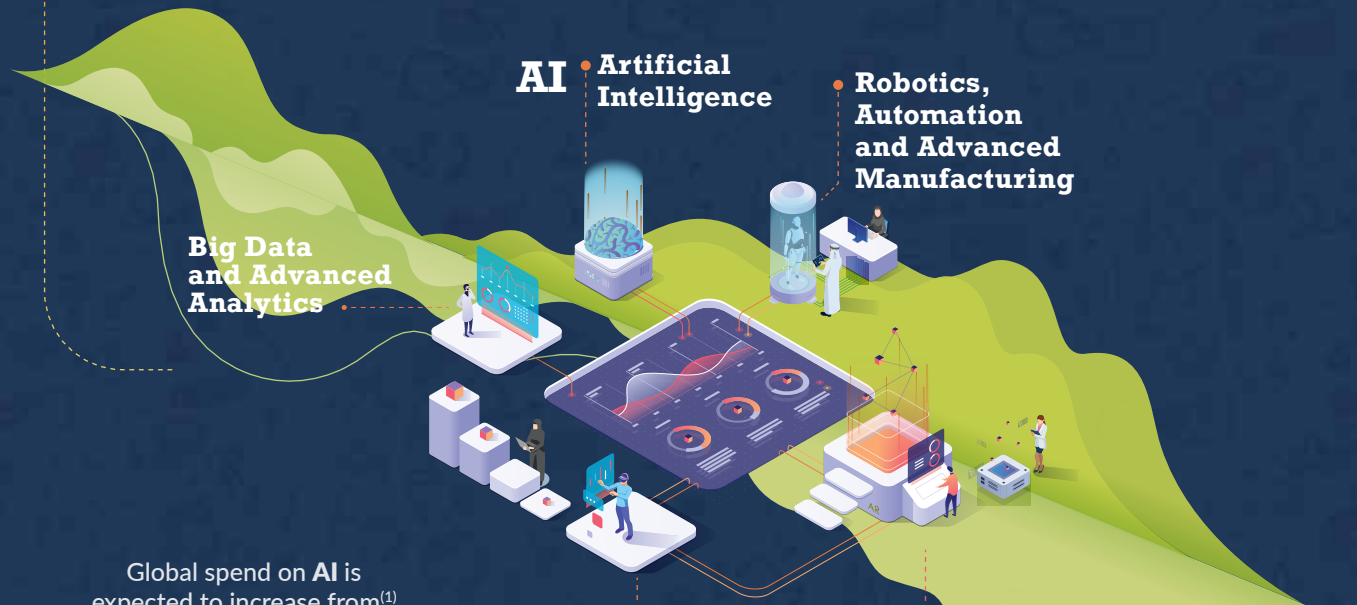
5 Changes in business & the economy

Flexible Business models and the sharing economy

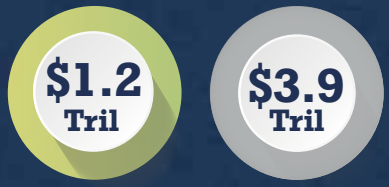
Globalization / Economic shifts

1 Rapid technological progress

Although technological advancements are expected to eliminate jobs, they are also opening new horizons for non-existing opportunities. It is expected that technology will be creating jobs as a net effect in the future.



Global spend on **AI** is expected to increase from[1]



2018 2022

(1) AI in Retail: Disruption, Analysis and opportunities 2018 - 2022, Juniper research.

Rapid technological progress 1

AR Augmented Reality
VR Virtual Reality

What is happening?

- VR and AR allow users to interact with a new virtual world. VR is typically achieved by wearing a headset, transporting the user to a completely new computer-generated world, whereas
- AR blends real life with virtual reality, by simulating a digital layer on the physical world.
- Beyond the popular applications in gaming and media, innovative use-cases for VR/AR have been emerging, creating immersive experiences in retail, education, health care, and manufacturing industries, to name a few.
- Commercial VR and AR devices nowadays simulate sight and hearing, but are also expected to simulate touch, smell, and taste in the future.

Why will this shape the future of jobs and skills?

- VR and AR will create more jobs across industries, notably in gaming and media and entertainment. To keep up, most industries will need AR and VR developers as well as immersive marketing experts.
- Another function that is completely being disrupted by AR and VR is product design, facilitating communication of complex ideas and speeding up prototyping.
- VR and AR are also expected to disrupt workplaces. As VR meets AI progressively, people will experience increasingly intelligent collaboration with machines at the workplace.

Big data and advanced analytics

What is happening?

- As the world is becoming more digital, a tremendous amount of data (Big Data) is being circulated awaiting to be captured and analyzed..
- Advanced analysis of this data will allow discovering deeper insights, making predictions, and generating recommendations across all industries without exception.

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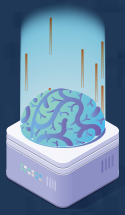
Rapid technological progress

1



AI Artificial intelligence

What is happening?

- Artificial intelligence (AI) refers to computer systems capable of performing complex intellectual tasks, and learning from data patterns.
- AI is expected to help solve major world problems in the future: keeping humanity safer from predicted disasters, addressing climate change, matching-up personalized medical treatments, etc.

Why will this shape the future of jobs and skills?

- AI's technological advancements will not only threaten jobs of laborers but also those of employees doing higher-cognitive tasks like salespeople, analysts, HR staff, marketers, etc.
- Machines are also already widely used to generate recommendations in many sectors including: finance, insurance, medicine, and education.
- AI does outperform humans in a vast array of tasks. However many human aspects of jobs relating to people interaction and emotional sensitivity are not expected to be replaced by technology.

Robotics, automation and advanced manufacturing

What is happening?

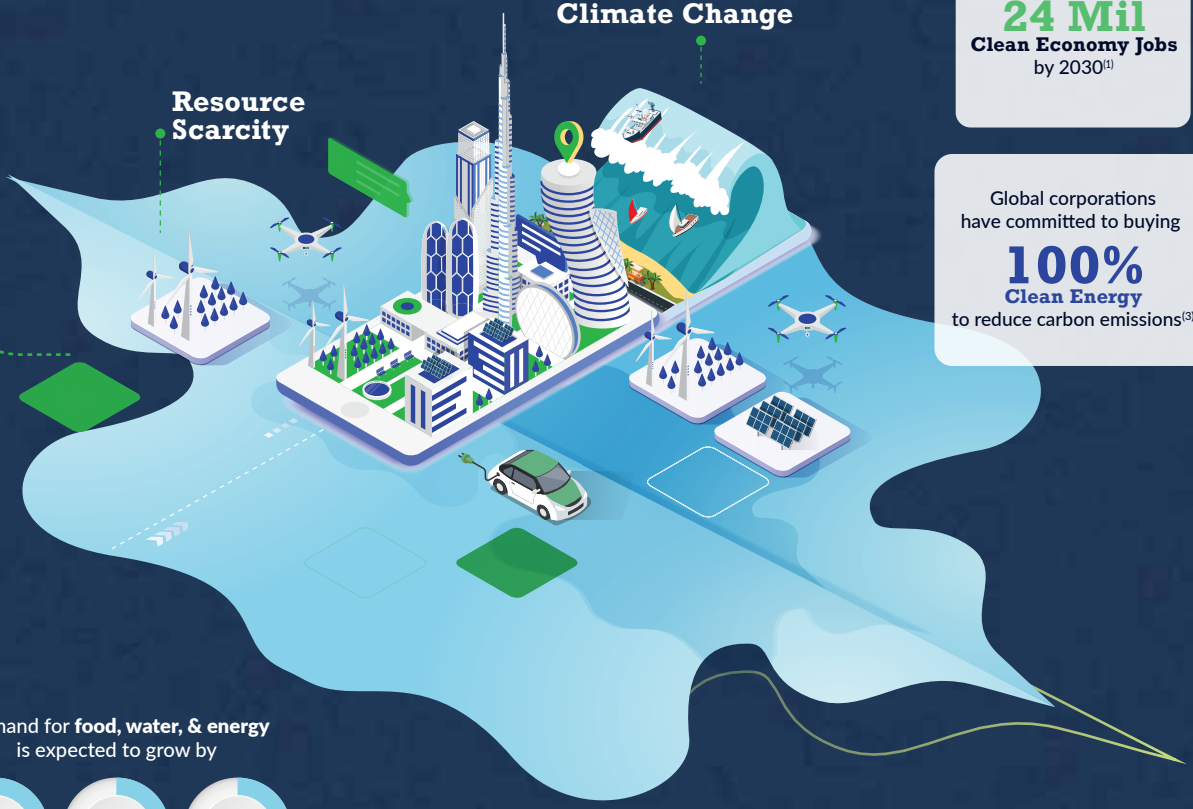
- Robotics, automation, and advanced manufacturing refer to machines and processes that would enable autonomous operation of physical tasks.
- Automation systems and robotic hardware technologies are advancing at such a fast pace that intelligent robots are taking over tasks that only humans used to do: manufacturing assembly, agriculture, building products, driving, performing surgeries, etc.

Why will this shape the future of jobs and skills?

- Smart robots have a strong potential to disrupt the job market as we know it today. For instance, driverless cars will disrupt the whole logistics sector, and 3D printing will transform the construction sector.
- The fact that smart robots can perform some tasks faster and at a lower cost than humans, also puts jobs with routine production operations at a risk. This is tipping industries into reimagining some traditional jobs, which will put additional pressure on human labor.

2 Drive towards sustainability

Organizations are creating new "green" roles and business lines, to address global challenges created by climate change and natural resource depletion.



24 Mil
Clean Economy Jobs
by 2030[1]

Global corporations have committed to buying
100%
Clean Energy
to reduce carbon emissions[3]

Demand for **food, water, & energy** is expected to grow by

35% 40% 50%

respectively between 2012 and 2030[2]

(1) World Employment and Social Outlook 2018: Greening with Jobs, ILO.

(3) Walmart, Nike, Starbucks commit to 100% clean energy; Fortune magazine article.

(2) Global Trends 2030: Alternative Worlds, USA National Intelligence Agency.

Drive towards sustainability

2

Climate change

What is happening?

- There is a clear consent globally that humans' activity induced global warming, leading to rising sea levels, extreme weathers, and agricultural yields decline. As such, many governments have signed cross-border contracts to limit emissions of greenhouse gases and decelerate global warming, leading to the rise of "Green economies".
- An example of these cross-border contracts is the Paris agreement that joins 180 countries and aims to keep the global temperature rise below 2 degree Celsius.

Why will this shape the future of jobs and skills?

- The new global mandate to limit emissions will have a radical impact on many industries and the way they operate. One example is the traditional energy sector, where new "green" agendas are being imposed. New lines of business are also emerging like: Electric vehicles, storage technologies, AI, etc.
- The public is more than ever holding companies accountable for their environmental impact. Environmental awareness is to become integrated across all industries. As such, developing "green-industries" savviness will prove to be increasingly important for future workers.

Resource scarcity

What is happening?

- Reports are highlighting that if humanity sustains its current growth and consumption trends, natural resources will be depleted at some point. Fossil fuel will disappear, water will become scarce, and the world's animal and agricultural stock would be under further strain.

Why will this shape the future of jobs and skills?

- To diffuse the frightening threat of resource depletion, governments and companies are forced to adapt. PwC expects that "new types of jobs in alternative energy, new engineering processes, product design and waste management and re-use will need to be created to deal with these needs", setting the stage for employee re-skilling and for new job openings in the field.

3 Socio-demographic shifts

As diversity keeps increasing, work skills required from employees are gravitating towards specific soft skills. The emergence of a new "older consumer" class is also dictating specific work skills and creating new economic opportunities.

Diversity at Work (inclusion)

Increasing Longevity

Under inclusive leadership
employees are
x3.5
more likely to **contribute** to **full innovation potential** (1)

and

39%
more likely to be engaged

(1) Why your diversity and inclusion strategy should consider more than gender and background, EY.

Socio-demographic shifts 3

Increasing longevity

What is happening?

- Globally, people are increasingly living longer and healthier lives. In fact, life expectancy at birth has increased globally by 6 years since 1990.
- Population longevity will in turn increase the number of economically active people aged 60 or above, driven by both a better health and financial necessity or the need to provide sufficient resources for retirement. This will have an impact on social support systems like pension and insurance globally. The larger number of economically active people among the older population will also put more pressure on opportunities for younger and less experienced people joining the workforce.

Why will this shape the future of jobs and skills?

- As new "older consumer" classes emerge, demand for opportunities, products and services like healthcare and social protections will grow. This will, in turn, affect the way work is performed, and business models in the economy.
- In regions with considerable population ageing, there are expectations of an increase in the need for automation and further productivity enhancements measures.
- Multiple careers, and lifelong learning and re-skilling are expected to become the norm for people to remain effective participants in the workforce. There will also be an increased focus on the importance of acquiring intergenerational communication and people skills.

Diversity at work (inclusion)

What is happening?

- A diverse workforce is rapidly becoming the norm across the world, with efforts being undertaken to make the work environment more inclusive, integrating more women, ethnic groups, people with disabilities, senior employees, etc.
- Women and marginalized groups are entering the workforce due to many demographic and social triggers. But there is also a growing consensus that diverse teams and work environments foster employee engagement, and produce more innovative and higher impact results.

Why will this shape the future of jobs and skills?

- Work skills required in the workplace are shifting to accommodate an increasingly diverse workforce. As such, organizations are increasingly expected to be more innovative in designing new ways to attract, develop and retain talent. They should have the flexibility to integrate people from different age groups, genders and backgrounds to achieve a workable balance between work and other commitments.
- Developing advanced people skills, particularly emotional and interpersonal intelligence and a cross-cultural proficiency, will become paramount for all workers to succeed in increasingly diverse environments.

4 Personal purpose and responsibility

Spirit of purpose and ethics and citizenship are increasingly helping employees strive in their workplaces. As such, young people would need to develop skills like self-reliance, a sense of initiative, and civic engagement.

90%
of executives recognize the necessity of having a business purpose

88%
said clearly articulated purpose helps increase customer loyalty(1)

94%
of millennials
want to use their skills to benefit a cause(2)

(1) The business case for purpose; Harvard Business Review.

(2) Millennial's Desire to Do Good Defines Workplace Culture; Kathy Gurchiek; Society for HR Management.

Personal purpose and responsibility 4

Spirit of purpose

What is happening?

- Youth are increasingly looking to have a fulfilling professional life where they would be able to achieve a sense of purpose, contributing to a bigger goal and finding intrinsic meaning in what they do beyond financial returns.
- A business purpose is "an aspirational reason for being which inspires and provides a call to action for an organization and its partners and stakeholders and provides benefit to local and global society", according to HBR, "The business case for purpose".

Why will this shape the future of jobs and skills?

- Businesses and startups will need to retool their processes in order to attract, engage and retain top talent and remain competitive in the new world.
- Individuals will increasingly need to develop self-reliance, a sense of initiative, and be rooted in moral responsibility to thrive and succeed in fulfilling careers

Ethics and citizenship

What is happening?

- Younger generations are increasingly embracing strong work ethics and a sense of citizenship in their work.
- In fact, in today's over mediatized world where news travel fast and have ripple effects, organizations cannot have room for moral ambiguity.

Why will this shape the future of jobs and skills?

- Organizations will have to place increasing importance on the value of moral duty at work.
- In order to achieve this, civic engagement, community service and volunteering topics will be crucial skills for youth to further develop, and act as global citizens.

5 Changes in business and the economy

New work dynamics embodies in a shift towards the freelance model and the glocalization of global businesses, are more than ever before requiring technological aptitude and new work skills like adaptation, and continuous learning skills.

Today's **learners** will have

8-10 Jobs

By the time they are **38 years old**(1)

Flexible Business Models and The Sharing Economy

Globalization and Economic Shifts

More than **80%**

of large corporations plan to substantially increase use of flexible workers in the coming years(2)

(2) Intuit 2020 report: Twenty trends that will shape the next decade; Intuit.

(1) The next era of human/machine partnerships; IFTF & Dell technologies.

Changes in business and the economy 5

Globalization & economic shifts

What is happening?

- Developing economies are increasingly gaining a larger share of global economic growth.
- With globalization reaching an unprecedented peak, we are slowly seeing the emergence of "glocalisation" (glocal = global + local) (Sharma). Large multinationals are maintaining their global operations, all while embracing local specificities in their overseas markets. Overseas customers are increasingly desiring international products adapted to their cultures and geographies.

Why will this shape the future of jobs and skills?

- As a result to glocalisation and the rise of local competitors in emerging economies, multinationals are no longer seeing emerging markets as sales and technical support hubs, but are starting to establish satellite headquarters there, that include innovation and design functions as well.
- Multinationals will increasingly establish core operations and knowledge-intensive services in emerging markets, and subsequently adapt their workforce and integrate it to their global operations. This will place increasing importance on the acquisition of the skills and technological aptitudes like cloud computing required to keep global companies connected and operating across continents.

Flexible business models and the sharing economy

What is happening?

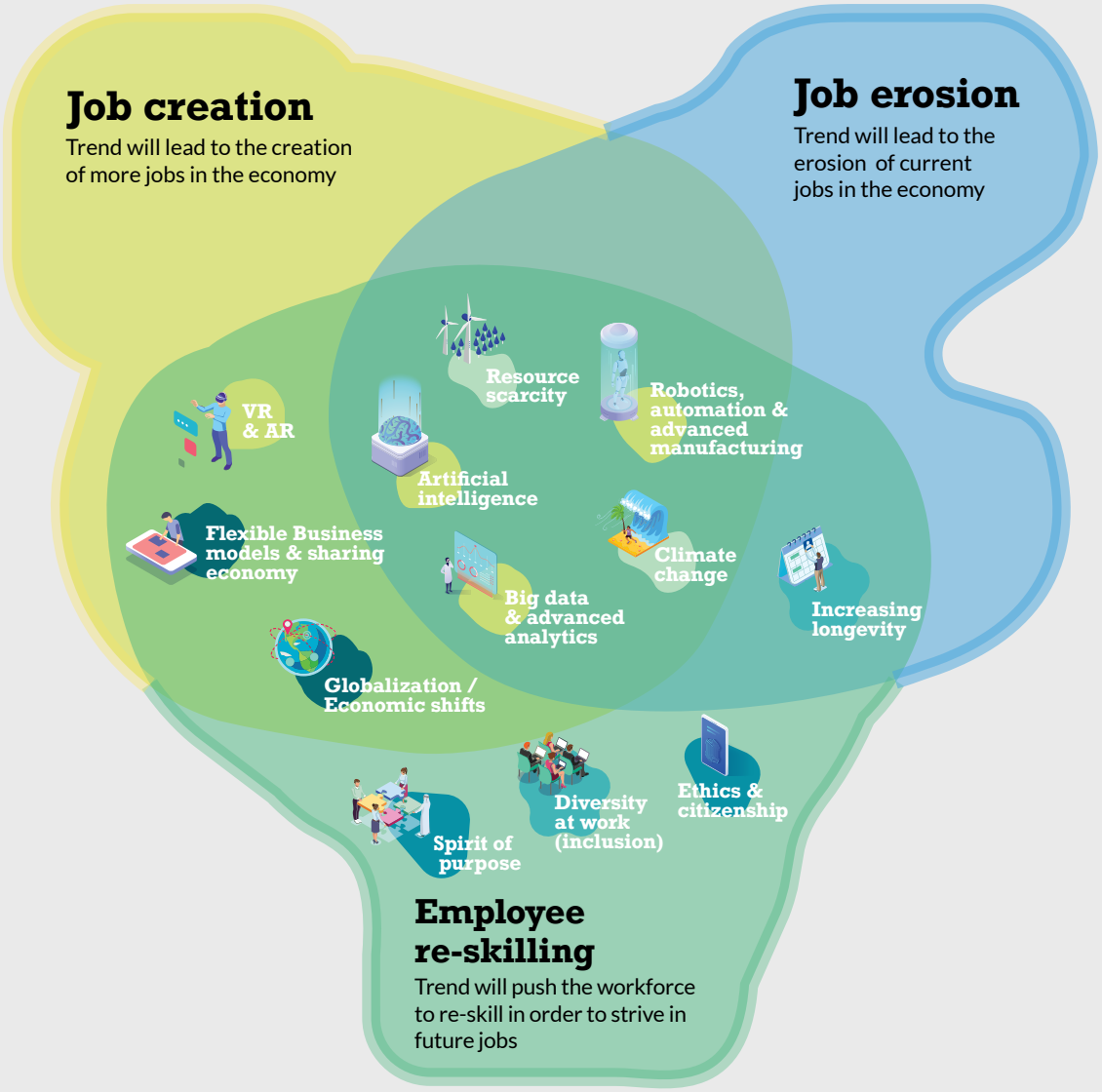
- Expectations of the upcoming young workforce are changing: people are no longer sticking to the one-employer career model.
- Instead of traditional employment, Youth are introducing new ways of working, expanding the scope of the sharing economy to cover almost every aspect of work within a wide array of sectors and industries. People will develop their own 'brands' and sell their skills to those who need them.

Why will this shape the future of jobs and skills?

- In the future, "freelancers will not be able to rely on traditional HR departments, onboarding processes, and many of the other affordances of institutional work" (IFTF/ Dell). Therefore, adaptation and learning skills will be increasingly important as workers will need to take charge of their learning journey. This continuous learning process will be mostly digital, allowing them to seamlessly access a myriad of courses and videos on nearly any topic.

DRIVING FORCES IMPACT

Each of the listed driving forces will impact the economy and workforce by creating or eroding jobs, or pushing employees towards re-skilling



Rapid technological progress

Socio-demographic shifts

Changes in business and the economy

Drive towards sustainability

Rise of moral responsibility

By 2030, 14 skills areas will be important to strive in future jobs

Personal skills

Entrepreneurship & self-promotion

M E

Self-development & active pursuit of new forms of learning

T D E

Resilience & adaptability

T D S E

Cross-cultural competency & transdisciplinarity

T D E

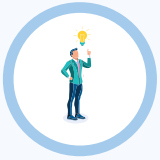
Cognitive skills

Sense-making & interpretive skills

T

Creativity & innovation

T



Complex problem solving

T E

People skills

Leadership & people management

T D M

Teamwork, collaboration & social intelligence

T D M

Emotional intelligence

T D

Knowledge

STEM knowledge & digital fluency

T S E

New media literacy

T E

Ecological ethos

S M

Industry-specific knowledge & expertise

Driving forces calling for the new skills

T Rapid Technological change

D Socio-demographic shifts

S Drive towards sustainability

M Rise of moral responsibility

E Changes in business and the economy

ADSW INDUSTRY PILLARS

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1

Future of Mobility

Future trends expected in Future of Mobility

Electric vehicles and new advanced batteries

Disruptive driving

Shared mobility

New mobility companies

Personal rapid transit

By 2030 shared vehicles could account for almost half of global passenger miles (McKinsey). The International Energy Agency (IEA) expects almost 1 out of 4 cars will be electric by 2030.

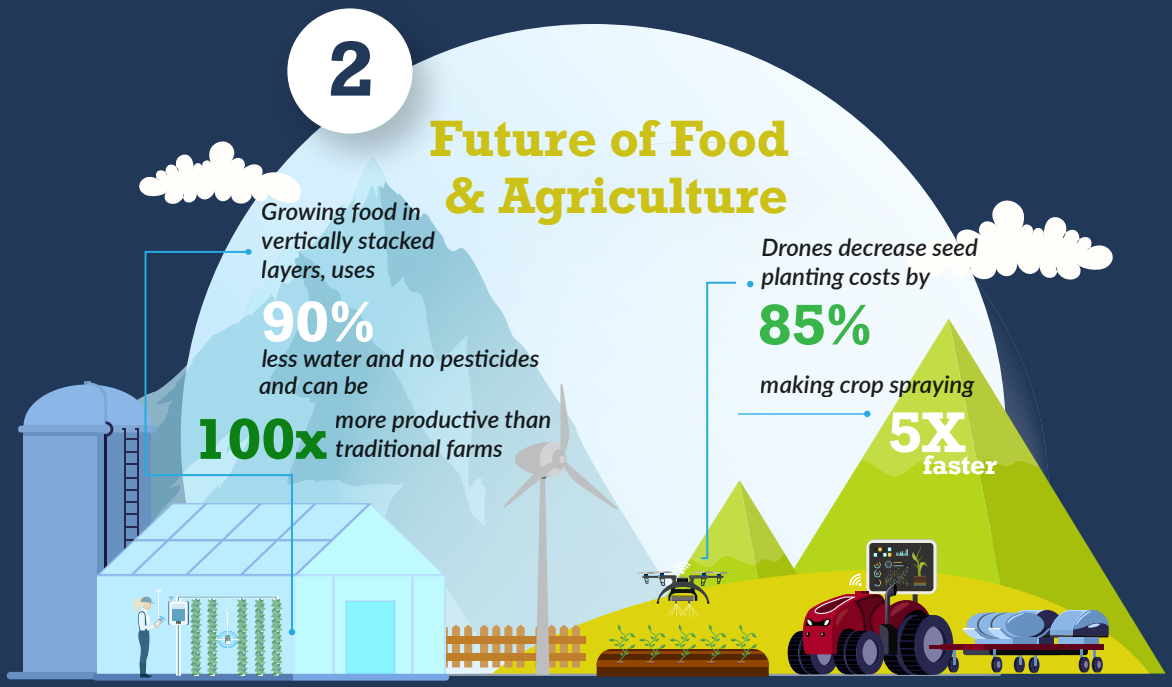
Sources: Designing future government jobs, Deloitte insights; Augmented and Virtual Reality in Operations, Capgemini; Making the future of mobility work, Deloitte Review issue 21, July 2017; The Future of Mobility, IPSOS Views October 2017; An integrated perspective on the future of mobility, McKinsey & Company and Bloomberg new energy finance; The potential impact of AI in the Middle East, PWC; Mobility solutions 2020-2030 and beyond!, The future of transportation executive briefing 2018

Examples of Energy & Climate Change job areas and skills becoming more relevant in the future

- Advanced manufacturing
- Advanced design (AR/VR-powered)
- Mobility platform management
- Smart road engineering, route planning, and automated traffic management
- Driverless "Ride Experience" design
- Driverless operating system engineers
- Advanced fleet operations
- In-vehicle services and systems (entertainment, security, etc.)
- Client relationship management
- 3D printing design
- Design for new battery technologies (e.g. hydrogen solutions and fuel cells)

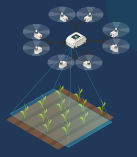
Examples of Energy & Climate Change job areas and skills becoming less relevant in the future

- Driving and vehicle operations
- Traditional manufacturing
- Vehicle insurance underwriting
- Maintenance and mechanics work
- Traditional air traffic control



Future trends expected in Future of Food & Agriculture

Alternative Protein sources



Drones for crop planning and monitoring

Nanotechnology-enabled precision agriculture

Genome engineering technologies

Vertical farming and hydroponics

Analytics and data-driven farming

Sources: Designing future government jobs, Deloitte insights; Seeds disruption, how technology is remaking the future of food, Institute For The Future; Agriculture 4.0: the future of farming technology, World Government Summit in collaboration with Oliver Wyman; The Farmer of 2030 – Big Changes are on the Way, Old Moor's Almanac; Top Six Digital Transformation Trends In Agriculture, Daniel Newman;

Examples of Energy & Climate Change job areas and skills becoming more relevant in the future

- Agriculture-specific drone operations
- Farming robot design and manufacturing (ground and air robots)
- Precision-farming technologies powered by technology (nanotechnologies, IoT, AI, and automation systems)
- Hydroponic and vertical farming
- Botanical and livestock genomics
- Sustainable food and biomaterial production
- Research on sustainable farming methods and systems
- Entrepreneurships in farming, and food security
- Ecology and environmental engineering
- Microbiome (Microbes control and engineering)
- Ecology and environmental engineering

Examples of Energy & Climate Change job areas and skills becoming less relevant in the future

- Traditional agricultural management
- Crop monitoring/consultation
- Farm manual labor (non-technology-based)
- Operations of traditional agricultural equipment
- Varmint extermination and spraying services

3

Future of Energy & Climate Change

Zero-emission energy sources will make up

60%

of installed generation by 2040

+40%

of Youth see climate change and the environment as the world's biggest challenge in the next decade

Future trends expected in the Energy and Climate Change space

- **Digitizing the infrastructure**
- **Greener economies**
- **More renewables and less coal**
- **Drive for efficiency**
- **Distributed energy**
- **Low-carbon economy**

Sources: "5 predictions for energy in 2030", World Economic Forum; "World Energy Outlook 2017", International Energy Agency ; "A Perspective on the Future of Energy: Scenarios, Trends, and Global Points of View", Electric power research institute; "New Energy Outlook 2016," Bloomberg New Energy Finance, June 2016, Bloomberg Finance L.P.; "The Energy Sector: Top 5 Trends and a Bright Future", Technavio blog; UAE Government portal; Future of Energy Series, Ernst & Young; "2017 U.S. Energy and Employment Report", Energy.gov; Frequently Asked Questions on Climate Change and Jobs, ILO;

Examples of Energy & Climate Change job areas and skills becoming more relevant in the future

- New energy engineering (distributed solar, off-grid power, waste-to-energy, carbon storage, etc.), installation and service
- Green and resilient facilities design & construction
- New-technology plants design and construction (including virtual power plants)
- Mini and micro grids
- Smart grid technologies engineering & operations: Wireless communications, sensors, AI, planning tools, etc.
- Electrification technologies (electric vehicles, heat pump, etc.)
- Energy management (energy efficiency, management systems, etc.)
- "Decommissioning" of traditional-energy
- Energy-related business intelligence and CRM capabilities
- Ecology, environmental protection, and waste management
- Low-carbon appliances and systems
- Design for new battery technologies (e.g. hydrogen solutions and fuel cells)
- According to the World Economic Forum, employment in solar and wind is exploding, generating jobs 2.5 times faster than fossil industries in the US

Examples of Energy & Climate Change job areas and skills becoming less relevant in the future

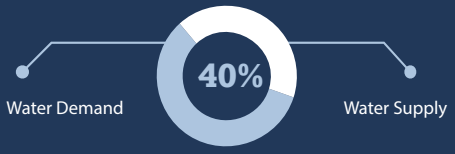
Certain jobs will disappear because of mechanization, but according to the ILO, "Certain jobs will be eliminated, [...] through banning or discouraging the use of a particular processing methods or resources especially in energy-intensive and polluting industries". Examples include: operations of conventional and coal-intensive energy plants, traditional mining and drilling, and traditional fossil-fuel operations.

4

Future of Water

Future trends expected in the Water space

- **Upgraded water infrastructure & technologies for efficiency**
- **Consumer education**
- **New technologies for water treatment**
- **Revamped processes and customer experience**



The gap between water supply and demand is projected to reach 40% by 2030 if current practices continue (World Economic Forum)

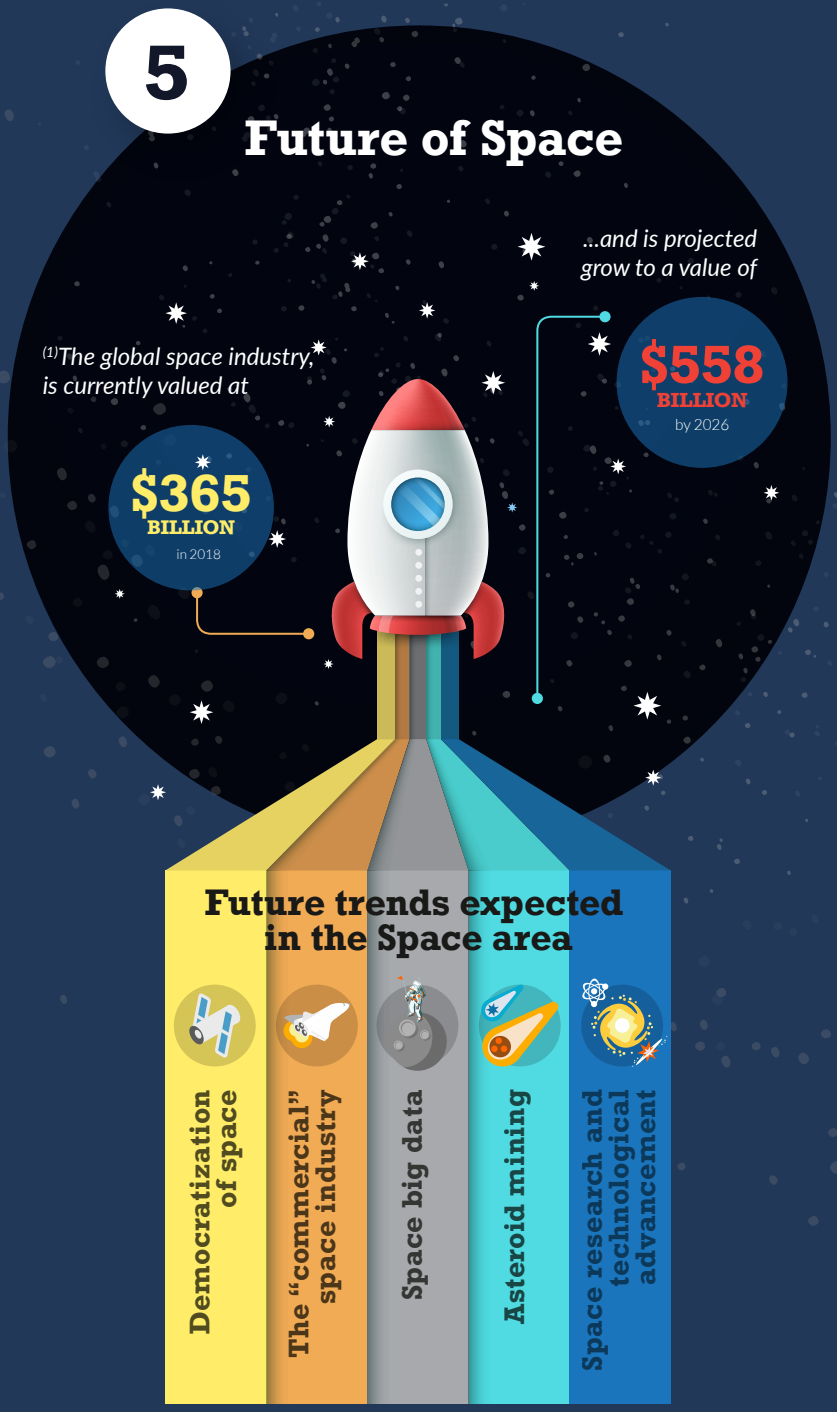
Sources: "5 key trends that will shape the future of water & wastewater", Flow Control Network; "Water tight 2.0: The top trends in the global water sector", Deloitte; "Turn down the heat", World Bank; "Closing the water gap", World Economic Forum; UAE government portal;

Examples of Water job areas and skills becoming more relevant in the future

- Water management, operations, and maintenance (drinking and wastewater)
- Integrated water resources (managing water resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems)
- Water conservation (ground and surface)
- Water transmission and distribution operations and maintenance
- Advanced water treatment operations
- Hydrology, hydrogeology, and water quality (technicians, scientists)
- Green building, and construction technology upgrades
- Water quality education, communication, policy and planning
- Ecology, environment, and sustainability
- Water and environment strategy
- Urban and regional planning
- Smart house infrastructure design

Examples of Water job areas and skills becoming less relevant in the future

- Traditional water and wastewater treatment plant and system operations (due to automation)
- Traditional water meter inspections, operations and maintenance
- Traditional irrigation



Sources: "Three trends for the future of space", Govinsider; "AR & Space Technologies: Future Trends », Astronaut.com; «Where will space technology take us by 2030, and what does this mean for life on Earth?", WEF; "Global Space Industry Market and Technology Forecast to 2026", **(1)** ASDreports; "The NewSpace Revolution: The emerging commercial space industry and new technologies", Geospatial world; "Beyond Musk: The Six Trends That Will Change Space Exploration Forever", Motherboard; "7 Future Careers for Space Science Grads", Florida tech Ad Astra; "10 space jobs from the near future", Wired; "Let's all move to Mars! The space architects shaping our future", The Guardian;

Space-related job areas and skills becoming more relevant in the future

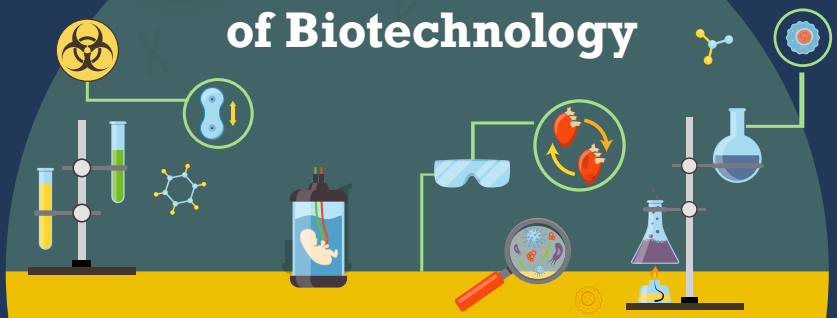
- Spacecraft design, manufacturing, testing, and operations
- Carbon fiber spaceship fabrication
- Space science data analytics
- Battery engineering
- Propulsion and electric propulsion engineering
- Micro and Nano-technologies (small satellites)
- Robotics design
- Solar power and cells engineering
- Biotech science
- Antennas and radio frequency engineering
- Software development (for space applications)
- Space customer experience design
- Space missions and launch sites operations
- Space architecture (designing orbital cities, planetary settlements, etc.)
- Space piloting
- Earth watching and monitoring (through sensor data, and satellite imagery)

Space-related job areas and skills becoming less relevant in the future

The space industry, and its jobs, are expected to grow with time. However the jobs that are under pressure the most are the ones that involve predicted manual labor and might be replaced by automated robots: manufacturing, servicing, maintenance, etc.

6

Future of Biotechnology



Future trends expected in the Biotechnology space

- Next-gen antibiotics
- Bioelectronic medicine
- Novel biotechnology platforms
- Lab-grown food
- Personalized (precision) medicine and new biopharma
- Human augmentation
- Regenerative medicine and organ production

The biotech sector

is filing more patents than many other sectors in Europe (European Patent Office)

More than 55%

of workers across the chemistry, advanced materials & biotechnology sectors, will need some reskilling[(1)]

Sources: "Biotechnology: what it is and how it's about to change our lives", World Economic Forum; "Preparing for Future Products of Biotechnology", National center for biotechnology information; "Top Ten Biotech Trends for the 21st Century", Institute for global futures; "What Does the Future of Biotechnology Therapies Look Like?", AMGEN; "The 5 Wildest Biotech Products Of The Future", Elsa Sotiriadis, PhD; "Possibilities for an in vitro meat production system", Innovative Food Science & Emerging Technologies; "Biotechnology: what it is and how it's about to change our lives", World Economic Forum; "The future of biotech", PMLive; "The 10 Best Jobs Of The Future", Ben Paynter; "The 10 Biotech Jobs Most in Demand Through 2024", Biospace; **(1)** World Economic Forum.

Biotechnology job areas and skills becoming more relevant in the future

- Nano-medicine
- Nano-technology applications in biotechnology
- AI and machine-learning applications in biotechnology
- Robotics applications in biotechnology
- Fetus-focused medicine (cure disease before the baby is born)
- Genetic counseling, and genetic engineering
- Biomedical and biochemical engineering
- Biochemistry, and biophysics
- Microbiology
- Epidemiology
- Clinical laboratory technology
- Biotech R&D
- Medical scientists
- Biopharma

Biotechnology job areas and skills becoming less relevant in the future

- Jobs related to traditional drugs and pharmaceuticals
- Jobs related to traditional medical devices and equipment

Prepared by Abu Dhabi Sustainability Week