

FLASHES

A MONTHLY MAGAZINE ON KNOWLEDGE AND DEVELOPMENT
BY THE MOHAMMED BIN RASHID AL MAKTOUM FOUNDATION

JANUARY 2017
ISSUE 25

Fiction and facts

What is science fiction for one
generation is sometimes the
reality of the next



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FOREWORD

Dear readers,

Welcome to the first Flashes issue of 2017. Last year was a busy and successful one for the Mohammed Bin Rashid Foundation (MBRF) on many fronts. One of the undisputed highlights was the third Knowledge Summit. The Knowledge Summit 2016, which took place from 5th to 7th December, explored the theme "Knowledge ... Present and Future". Once again the Summit attracted high-ranking decision makers, ministers, senior officials, academics, and specialists from around the world.

We would like to thank His Highness Sheikh Maktoum bin Mohammed bin Rashid Al Maktoum, Deputy Ruler of Dubai, for presenting the Mohammed bin Rashid Al Maktoum Knowledge Award at the opening ceremony. We would also like to congratulate the well-deserved winners: The Arab Thought Foundation, Chaired by HRH Prince Khalid Al Faisal, Masdar, Abu Dhabi Future Energy Company and Melinda Gates, Co-chair of the Bill & Melinda Gates Foundation.

Another highlight of the opening ceremony was the announcing of the inaugural Arab Reading Index results. The

Index, which resulted from an extensive joint effort between MBRF and the United Nations Development Program, is the first of its kind in the region. The Index is a scientific and standardised tool that tracks reading patterns in the Arab World. This is in a bid to assign quantifiable numerical data to the process of cultural development in the region.

A key finding of the Index, which drew more than 148,000 respondents, was that Arabs, on average, read 35 hours a year and finish an average of 16 books.

The Arab love of reading was further highlighted by last year's Arab Reading Challenge, which was a huge success with more than 3.5 million students in the Arab world reading more than 150 million books. This year's target is to double that number to seven million students reading 350 million books. 2016, which was the Year of Reading in the UAE, may be past but our efforts to encourage reading will continue.

Jamal Bin Huwaireb
MD of Mohammed Bin Rashid
Al Maktoum Foundation

2017 is the 'Year of Giving'

UAE President His Highness Sheikh Khalifa bin Zayed Al Nahyan declared 2017 as the 'Year of Giving'. The 'Year of Giving' will focus on three main pillars – the first of which aims at creating a sense of community responsibility in the private sectors so as to fulfil their role in serving the community and contribute in the developmental march of the country. The second pillar focuses on enhancing the spirit of volunteering and encouraging specialized volunteer programmes that will effectively assist in social development and community services. The third pillar aims at instilling loyalty and commitment in the next generation to serve their country, a trait that is characteristic of Emiratis who were raised to love and serve their country.

The UAE President affirmed that designating 2017 as the 'Year of Giving' mirrors the method adopted by the UAE ever since its formation, a method based on helping others without expecting anything in return. His Highness further explained that the UAE is known for its philanthropic activities and helping the less fortunate worldwide while the people of the UAE follow in the footsteps of the late Sheikh Zayed bin Sultan, the world-renowned philanthropist.

His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, directed the establishment of a framework to implement the 'Year of Giving', set out targets, draft federal and local initiatives, coordinate volunteer works, and promote a culture of social responsibility. HH Sheikh Mohammed highlighted that the programmes and initiatives of the 'Year of Giving' will target the private sectors in particular, given the fact that it is an important and major partner in the developmental march of the country.

His Highness affirmed that allocating a year to celebrate and disseminate charitable works reflects the UAE's prominent position as one of the world's top humanitarian donors, thanks to the relentless efforts of UAE President



His Highness Sheikh Khalifa bin Zayed, and Abu Dhabi Crown Prince and Deputy Supreme Commander of the UAE Armed Forces His Highness Sheikh Mohamed bin Zayed Al-Nahyan.

HH Sheikh Mohammed further asserted that the 'Year of Giving' sends a message of love, tolerance and hope from the UAE leaders and its generous people to the region and the entire world.

HH Sheikh Mohammed also approved the official logo of the 'Year of Giving 2017', which is to be used by all local, government and media entities in all campaigns and programmes related to the initiative. The word 'Giving' represents the main component of the logo. The last letter of 'Al Khair', which is Arabic for Giving, is written in the form of the frond of a palm tree, as palm trees have huge moral and cultural value in the UAE.

The UAE observed 2016 as the 'Year of Reading', as part of which over 1,500 reading initiatives were launched. The country also issued the National Reading Law and announced the launch of the AED 1bn Mohammed bin Rashid Al Maktoum Library in Dubai. †

THREE MAIN PILLARS OF THE 'YEAR OF GIVING'



CREATING A SENSE OF
COMMUNITY RESPONSIBILITY
IN THE PRIVATE SECTORS



ENHANCING THE SPIRIT
OF VOLUNTEERING
AND ENCOURAGING
VOLUNTEERING PROGRAMMES



INSTILLING LOYALTY AND
COMMITMENT IN THE NEXT
GENERATIONS TO SERVE
THEIR COUNTRY

Flashes of Thought for School Curricula

The Ministry of Education has included the book, *Flashes of Thought*, written by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, in the school curriculum for the second semester.

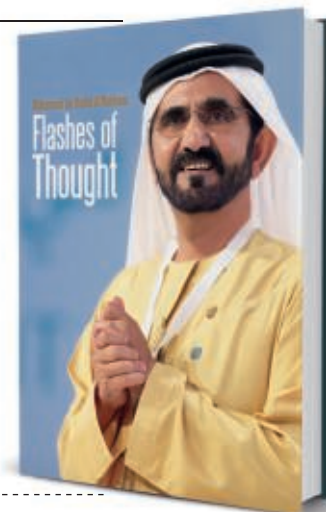
The Department for Middle School Classes Curricula of the Ministry of Education included the book in the eighth grade curriculum. It also prepared an exercise book as a companion to *Flashes of Thought*.

The exercise book will help students

learn the meanings and definitions of various terms and the values that the ministry seeks to impart.

Flashes of Thought comprehensively covers human and civilisational knowledge and summarises the experiences of a wise leader. It also introduces the students to important phases of the country's history.

The book was based on information obtained through 36 questions that His Highness Sheikh Mohammed answered during the Governmental Summit held in 2013. †



Expansion for Dubai's International Humanitarian City

Following directives from His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, Dubai's International Humanitarian City has announced comprehensive expansion plans to enhance operations, accelerate aid response and improve management of relief projects in high stress regions worldwide.

The International Humanitarian City in Dubai was created by His Highness Sheikh Mohammed in 2003 as the only humanitarian free zone in the world, and has now grown to host 9 UN Humanitarian Agencies, and over 50 International NPOs, intergovernmental organisations and commercial companies. In 2007, the IHC became a global humanitarian logistics hub. With a vast warehouse network, it stores, protects and organises aid supplies for its members and facilitates the delivery of this humanitarian aid when called upon.

The IHC is now the world's largest and most active logistics hub, enabling humanitarian actors with world-class logistics infrastructure, by giving them value added services and administrative support. The IHC also acts to facilitate coordination and collaboration between all the international



organisations, and regional and local humanitarian entities in their aid delivery efforts.

In the last two months, the IHC has made heavy lifts of emergency aid after being called upon by the United Nations. In September, under the directives of HH Sheikh Mohammed, an airlift carrying more than 100 tons of relief supplies was sent to Entebbe, Uganda on his Boeing-747 to provide assistance to more than 60,000 refugees from South Sudan. In October, the IHC also delivered 90 tons of relief supplies on the same Boeing 747 to those affected by Hurricane Matthew in Haiti.

The IHC is known for its ability

to make big single lifts of aid (over 90 tons of relief in one single lift) in record response times, normally anywhere between 3 – 36 hours. But HH Sheikh Mohammed has now guided the Board to look at solutions to operate smaller aircraft at the same time, as the frequency of demand for response is increasing.

The IHC's board of directors is working on the implementation of high-level simulation exercises of emergencies, with high demand for warehouses, membership, and increased logistics support. As part of this restructuring, the board will also look to separate logistics, governance and development functions. †

KNOWLEDGE

The third edition of The Knowledge Summit continued to build on the success of the high attendance.



GLOBAL SPEAKERS



HE Tony Abbott,
Former Prime
Minister of
Australia



Thomas Frey, the
Executive Director
and Senior Futurist
at the US-based
DaVinci Institute



**Philip
Tetlock,**
Researcher
and
Futurist



Tony Wagner,
Expert in Residence
at Harvard
University's new
Innovation Lab



SUMMIT 2016

the previous two instalments, as evidenced by the calibre of its speakers and



Knowledge Summit 2016, which bore the theme “Knowledge... Present and Future”, is an annual event held under the patronage of His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, as well as under the directives of HH Sheikh Ahmed bin Mohammed bin Rashid Al Maktoum, Chairman of the Mohammed bin Rashid Al Maktoum Foundation (MBRF). The event is organised by MBRF and focuses on the vital role knowledge plays in institutional and individual growth.

Among the notable international speakers during the three-day event were HE Tony Abbott, Former Prime Minister of Australia; Thomas Frey, the Executive Director and Senior Futurist at the US-based DaVinci Institute; Philip Tetlock, Researcher and Futurist; Tony Wagner, expert in Residence at Harvard University’s new Innovation Lab; Daniel Kraft, a Stanford- and Harvard-trained physician-scientist and innovator; Hugh Herr, Associate Professor, Media of Arts and Sciences, Health Sciences and Technology, MIT Media Lab; Jason Silva, Media Artist and TV personality; and Brandon Stanton, photographer and creator of popular blog *Humans of New York*. †



Daniel Kraft, a Stanford- and Harvard-trained physician-scientist and innovator



Hugh Herr, Associate Professor, Media of Arts and Sciences, Health Sciences and Technology, MIT Media Lab



Jason Silva, Media artist and TV personality



Brandon Stanton, photographer and creator of popular blog *Humans of New York*



His Excellency Jamal bin Huwairb, Managing Director of MBRF

“To implement these initiatives, it is imperative that we seriously and proactively anticipate and plan for the future as a basis for decision-making.”

His Excellency Jamal bin Huwairb,
Managing Director of MBRF

“To implement these initiatives, it is imperative that we seriously and proactively anticipate and plan for the future as a basis for decision-making,” HE bin Huwairb added. “This is where the Knowledge Summit 2016 comes in. This year, the Summit puts forth a revolutionary initiative – the Arab Reading Index – born out of the extensive joint efforts of the Mohammed bin Rashid Al Maktoum Foundation and the United Nations Development Program. The index is an important tool capable of evaluating reading and cultural patterns in the Arab region.”

Sophie de Caen said that the support and partnership that the UAE had provided to UNDP had yielded extremely positive results. Among others, it had seen the publication of four major regional analytical reports on critical aspects of knowledge and education, as well as the Knowledge4All Web platform, the Arab Reading Index, and the Arab Knowledge Index.

The Summit’s guest of honour, Former Australian Prime Minister HE Tony Abbott, remarked on Dubai’s achievements and how far the emirate had come since he first visited in 2010. “What was a few decades ago a sleepy desert outpost has been transformed into a wonder of the modern world. The main driver in this success was the UAE’s focus on education. I hope your example will be compelling to countries throughout the region. Knowledge events like this are very important because they build bridges of communication; they show that what binds us is stronger than what divides us.”

Opening Ceremony Sets the Scene

The opening ceremony took place in the packed auditorium of the Grand Hyatt Dubai hotel.

His Highness Sheikh Maktoum bin Mohammed bin Rashid Al Maktoum, Deputy Ruler of Dubai, attended the opening ceremony, while the Chairman of MBRF, HH Sheikh Ahmed bin Mohammed bin Rashid Al Maktoum, was also in attendance.

His Excellency Jamal bin Huwairb, Managing Director of MBRF; the guest of honour, HE Tony Abbott, Former Prime Minister of Australia; Ban Ki-moon, the United Nations Secretary-General (in a televised message); Sophie de Caen, Deputy Assistant Administrator and Deputy Regional Director for the Regional Bureau for Arab States at the United Nations Development Program (UNDP); and Turki Aldakhil, General Manager of Al Arabiya Television Network in Dubai, spoke at the opening ceremony.

“The leaders of the United Arab Emirates realised early on the significant role of knowledge and reading in building sustainable communities,”

said HE Jamal bin Huwairb while referring to some of the UAE Government’s knowledge-focused initiatives such as the ‘Year of Reading 2016’ and the ‘National Strategy for Reading 2026’, launched by HH Sheikh Khalifa bin Zayed Al Nahyan, President of the UAE, and the ‘Arab Reading Challenge’, launched by HH Sheikh Mohammed bin Rashid Al Maktoum.



Former Australian Prime Minister HE
Tony Abbott



Winners of the Mohammed bin Rashid Al Maktoum Knowledge Award Honoured

His Highness Sheikh Maktoum bin Mohammed bin Rashid Al Maktoum, Deputy Ruler of Dubai, presented the coveted Mohammed bin Rashid Al Maktoum Knowledge Award to three winners.

The 2016 winners of the \$1 million award were The Arab Thought Foundation, Chaired by HRH Prince Khalid Al Faisal; Masdar, Abu Dhabi Future Energy Company; and Melinda Gates, Co-chair of the Bill & Melinda Gates Foundation.

The Mohammed bin Rashid Al Maktoum Knowledge Award is presented every year during the Knowledge Summit to honour a person or institution that has made clear contributions to the efforts of disseminating knowledge. The main aim of the Knowledge Award is to encourage those working in knowledge related fields to innovate and create new ways to spread knowledge globally. In 2015, the inaugural year of the Knowledge Award, the winners were the National Geographic Channel; Hiroshi Ishiguro, Professor of the Department of Innovation Systems in the Graduate School of Engineering Science at Osaka University; and Ahmed Alshugairi, presenter of the 'Khawatir' television programme.

HE Jamal bin Huwairib, Managing Director of MBRF, said: "The Mohammed bin Rashid Al Maktoum Knowledge Award recognises intellectual and creative achievements by honouring those innovators behind the global efforts to produce and disseminate knowledge, and encouraging

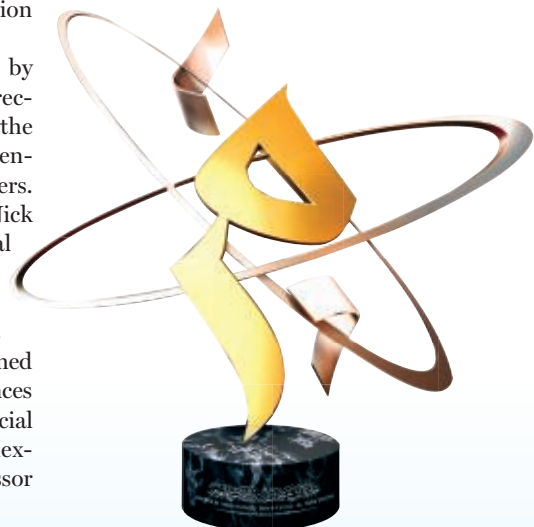


Accepting the award on behalf of Ms Gates was Hassan Al-Damulji, Head of Middle East Relations, Bill & Melinda Gates Foundation; while HE Dr Sultan Ahmed Al Jaber, UAE Minister of State – Chairman of Masdar, accepted the award on behalf of the Abu Dhabi-based Masdar company. HH Prince Bandar bin Khalid Al Faisal Bin Abdul Aziz, Chair of Board at ATF, accepted the award on behalf of the Foundation.

them to carry on with their quest. The Award reflects Dubai's determination to create a competitive environment that promotes a culture of innovation and creativity."

A board of trustees, chaired by HE bin Huwairib, Managing Director of MBRF, Vice Chairman of the Board of Trustees and Secretary General of the Award, selects the winners. Other Members of the Board are Nick Rawlins, Professor of Behavioural Neuroscience at the University of Oxford; David Bennett, Vice President, Global Corporate Partnerships at National Geographic; Dr. Ali Ahmed Al Ghafli, Vice Dean for Social Sciences at the College of Humanities and Social Sciences, UAE University; and Alexander J.B. Zehnder, Visiting Professor

and Member of the Board of Trustees of Nanyang Technological University (NTU), Singapore. ↑



THE 2016 WINNERS



Melinda Gates,
Co-chair of the Bill & Melinda Gates Foundation



Masdar,
Abu Dhabi Future Energy Company



The Arab Thought Foundation,
Chaired by HRH Prince Khalid Al Faisal

Results of The Arab Reading Index Announced

Turki Aldakhil, General Manager of Al Arabiya Television Network in Dubai, announced the highly anticipated results of the inaugural Arab Reading Index at the opening ceremony. The Index is the first of its kind in the region and it presents a scientific and standardised tool that tracks reading patterns in the Arab World, all in a bid to assign quantifiable numerical data to the process of cultural development in the region.

Aldakhil highlighted that there was a major misconception about reading in the Arab world, based on erroneous statistics that claimed that Arabs only read six minutes – a quarter of a page – per year.

“The study gives us insight into the realities of reading in the Arab world, revealing exactly how much the average



Turki Aldakhil, General Manager of Al Arabiya Television Network in Dubai

Arab citizen reads, what they read, and in which languages, among other parameters. The Index also showed that, contrary to popular belief, Arabs,

on average, read 35 hours a year – 15 hours within school or work hours and 20 outside of them. Meanwhile, the average number of books read is 16 per year – including seven within school or work hours and nine outside of them.”

“What is more,” Aldakhil continued, “e-reading surpasses traditional reading. As far as paper publications go, respondents read scientific books, novels, specialised magazines, newspapers, and comics, in that order. Meanwhile, in e-reading, the survey showed that social media topped the list, followed by news websites, e-books, and blogs.”

The results of the Arab Reading Index was explored in more detail on Day 2 of the Summit in a session entitled ‘The Future of Reading in the Arab World’.

Future Technologies... What's Hidden?

Thomas Frey, the Executive Director and Senior Futurist at the US-based DaVinci Institute, opened the first session on Day One of the Knowledge Summit 2016. His enthusiasm and detailed presentation made it clear why he is Google's top rated Futurist speaker. Frey painted a clear picture of how the pace of technological innovation was constantly accelerating and its disruptive effect.

Frey believes that about two billion jobs would be lost by 2030 due to technological advancement. “No industry is safe from the technological displacement of jobs,” he said, citing that driverless cars could eliminate jobs in up to 128 industries. However, driverless cars are just one disruptive force in the labour market. Artificial intelligence is quickly eating up customer service jobs, while factories are increasingly



Thomas Frey, the Executive Director and Senior Futurist at the US-based DaVinci Institute

hiring robots to do the repetitive tasks once performed by humans.

However, Frey also made it clear that as jobs are lost, many more will be created. “Disappearance of jobs does not mean running out of work to do. Exponential decrease creates equally exponential

capabilities,” he explained.

“Where will our mega accomplishments come from? From futuristic industries: Internet of Things (IoT), 3D printing, flying drones, artificial intelligence, driverless technologies and contour crafting, among others.”



Future Foresight: Against Ideological Extremism

The consensus of the expert panelists discussing ideological extremism at the Knowledge Summit 2016 was that military power is not enough to defeat terrorist groups such as Daesh. They warned that an ideological victory over terrorist propaganda was also needed.

Dr Sultan Al Nuaimi, faculty member of Abu Dhabi University who moderated the session, explained that terror groups are simply “by products” of extremist ideologies that need to be rooted out from societal discourse in order to achieve a permanent solution.

His view was backed by Jawad Anani, Jordan's Deputy Prime Minister for Economic Affairs and Minister of State for Investment Affairs, who stressed the important role of knowledge.

“Knowledge is the ability to choose between two contradictory points of view. Addressing what constitutes knowledge, therefore, is an essential part of the equation. If the underlying extremist ideology is not weeded out, it will eventually poison the minds of our young people.”

Theodore Kattouf, former US Ambassador to the UAE, echoed this view. “The key to combating extremism lies in education, especially in encouraging critical thinking skills – without which young people would lack the ability to resist extremist ideologies,” he said. He also cited the importance of job creation as a counter to extremism.

Ahmed Ouzzi, Professor of Higher Education and Scientific Research at the University of Mohamed V in Rabat, said that traditional structures, including the family unit and education, are failing to keep up with the younger generation.

“Globalisation, across borders, did not pay enough attention to citizenship and values. We are not equipping students with the right values – and there is a wide gap between parents' expectations and the reality experienced by young people. There is now no alignment between what a pupil is learning at school and what society requires,” he said.

Best-selling British writer Ann Morgan argued that the root cause of extremism stems from a fear of “others”, and the silencing of other points of view. “If voices are not heard, then there is no dialogue, and no possibility of progress,” she said. †

Knowledge and Future Cities

One of the stated aims of the UAE Vision 2021 National Agenda is to create a competitive knowledge economy. As a result Dubai is positioning itself strategically to capitalise on the knowledge economy and has a clear roadmap for the future.

The synergy between knowledge and Future Cities was explored by a panel of experts that included His Excellency Saeed Al Tayer, Managing Director and CEO of the Dubai Electricity and Water Authority (DEWA); Her Excellency Dr. Aisha Butti bin Bishr, Director-General of the Smart Dubai Office; Vivek Wadhwa, Academic Researcher, Writer and Entrepreneur; Bibop G. Gresta, Chairman and COO of Hyperloop Transportation Technologies, Inc.; and Dirk Ahlborn, CEO of Hyperloop Transportation Technologies, Inc.

According to HE Al Tayer one of the most important elements in the development of smart cities is cooperation between all the relevant authorities to improve in all services – particularly, the interaction between the public and private sectors. Green and efficient technologies were also playing a major part in Dubai's future, highlighted by projects such as the AED50 billion Mohammed bin Rashid Al Maktoum Solar Park.

HE Dr. Aisha Butti bin Bishr pointed out “There is no one definition for smart cities. Each city saw a set of challenges to address and adopted a set of technologies to face them. For us, a smart city is a city that offers an easy and satisfying experience for its residents.”

“Technology is progressing exponentially; everything tech touches goes on an exponential curve. This presents immense opportunities for cities like Dubai to become a manufacturing hub for the entire Middle East region, as well as parts of Asia,” said Vivek Wadhwa.

Dirk Ahlborn and Bibop G. Gresta from Hyperloop Transportation Technologies believe that this new technology offers numerous advantages to the cities of the future by enabling them to deal with problems currently plaguing the transportation sector, such as traffic congestion, pollution and road safety. The company is closely collaborating with the Dubai Roads and Transport Authority (RTA), in a partnership facilitated by the Dubai Future Foundation, to build the world's first functioning Hyperloop system. †



The Future of Reading in the Arab World

The results of the Arab Reading Index, which had been announced during the Opening Ceremony, were explored in more detail by a panel of experts. This study carried out by MBRF was meant to canvass 20,000 people, but it actually drew 148,000 respondents from all around the Arab World – the largest participation in the world.

The Index looked at patterns in 22 countries across the Middle East and North Africa region and was produced through a partnership between MBRF and the Regional Bureau for Arab States of the United Nations Development Program.

The Index found that the average number of books read across all Arab countries amounted to 16 per year including seven at schools and universities. The average number of Arabic books read was 11, while the average number of foreign-language books was nearly six.

Lebanon topped the Index of 22 countries with a score of 90, followed

by Egypt with 89, Morocco with 87, the UAE with 82, and Jordan with 71.

HE Jamal bin Huwareb, MBRF's Managing Director said: "We had always heard these statistics being cited, claiming that Arabs only read six minutes on average every year and that, statistically, it takes 80 Arabs to read one book every year. We were very sceptical and sought to determine the source of these statistics only to find that there was virtually no sound evidence to support them. That is why we launched the Arab Reading Index, and set out to find the accurate data ourselves – and from all Arab countries."

The Index also measured accessibility to books in each of the countries and found that – on average – 46 per cent of respondents have access to books at home, 52 per cent have access at school, while 37 per cent have access to books in wider society. The survey also revealed that 65 per cent of respondents view reading as a necessity, and 70 per cent of them consider it to be no less

important than education.

The majority of the respondents also favour digital means of reading over traditional ones – with 19 of the 35 hours spent on reading every year dedicated to digital.

"The sample is massive," said Dr. Hany Torky, Chief Technical Advisor of the UNDP. "Normally, a sample would be 1,000 respondents per country, which means we only needed 22,000 individuals for the Index to be considered reliable. We had 148,000."

Najoua Ghriss, Professor at the Higher Institute of Education and Continuous Training in Tunisia and main



From left: Najoua Ghriss, Professor at the Higher Institute of Education and Continuous Training in Tunisia, Jamal Bin Huwareb, Managing Director of the Mohammad Bin Rashid Al Maktoum Foundation, and Hany Torky, Chief Technical Advisor, Arab Knowledge Project, United Nations Development Program at the session "The Future of Reading in the Arab World" on the second day of The Knowledge Summit 2016.



35 HRS/YR

The average Arab citizen reads



16 BOOKS/YR

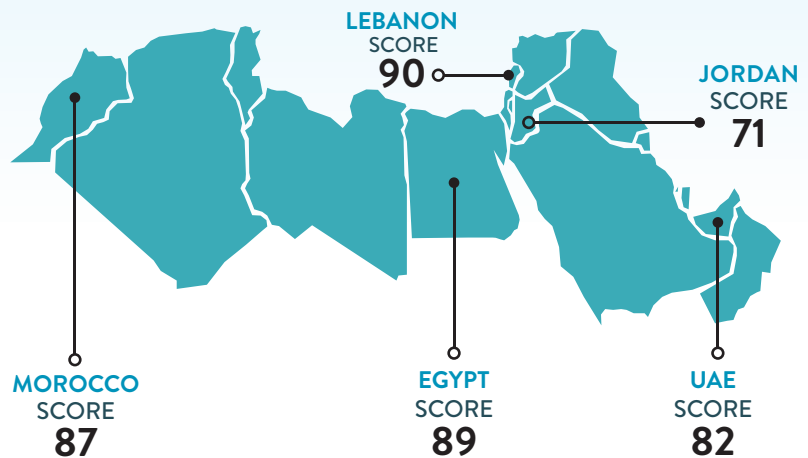
The average number of books read



author of the Arab Reading Index, said: "It is important to have many initiatives to improve education in the region, but it is more important to find ways to synergistically integrate them. I believe the Arab Knowledge Index succeeded in doing just that; it created an infrastructure to foster knowledge and sustainable development.

"Seeking knowledge without reading is simply inconceivable. This is why, if we are serious in our efforts to spread knowledge, we must establish tools to measure and monitor reading. This is where the Arab Reading Index comes in – its legitimacy comes from the fact that it was borne out of the Arab Reading Challenge."

THE ARAB READING INDEX



Reading, Diagnosing Reality and Future Foresight

Reading plays an integral role in promoting culture and preserving national identity was the finding of HE Dr Ahmed Belhouli Al Falasi, UAE Cabinet Member and Minister of State for Higher Education; Elias Bou Saab, Lebanese Minister of Education and Higher Education; and Professor Nouredine Selmi, Tunisian Deputy Minister of Higher Education and Scientific Research.

"We must encourage children to begin reading as early as possible because if they can master their mother tongue, they'll be better prepared to learn other languages. On the flip side, if their proficiency in their mother tongue is weak, they will turn to other cultures and will no longer be an effective element of society. We must use technology to enable our children and encourage them to read."

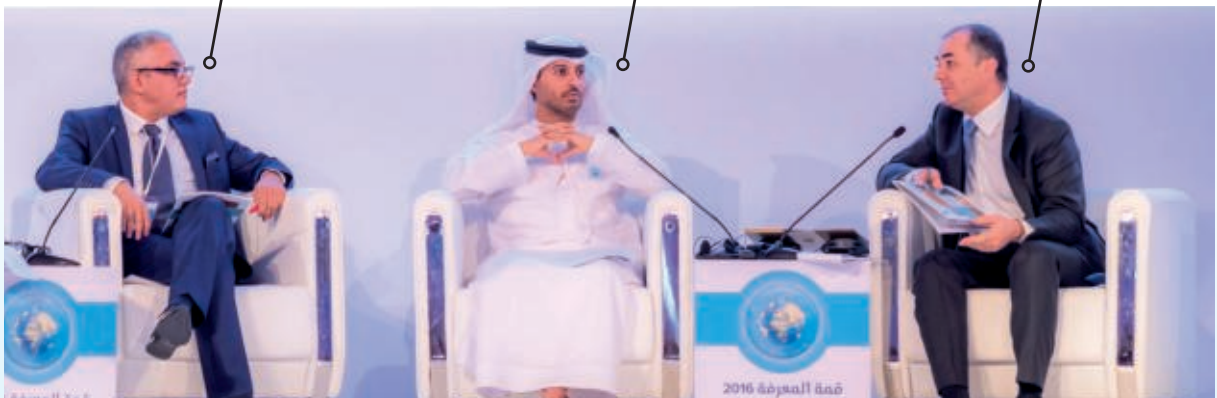
Professor Nouredine Selmi

"Having a library at the school that includes extracurricular books encourages a child to read more. We also have to understand that the young generation is different – and we should support their digital reading habits."

Dr Ahmed Belhouli Al Falasi

"Reading is the very foundation of education itself. We need to strengthen the Arabic language in our societies and to achieve this, we must simplify our curricula and update it to be compatible with today's rapidly changing world."

Elias Bou Saab



Education Technologies and the Future



His Excellency Hussain Bin Ibrahim Al Hammadi, UAE Minister of Education and Chairman of the National Commission for Education, Culture and Science, believes that electronic learning cannot be ignored.

"Today, education and technology are intrinsically linked. They are two sides of the same coin. And this generation is different to ones before – they are constantly updating themselves on today's trends. We have to find effective ways of using this, or risk being left behind."

He highlights the establishment of the model Emirati School in Abu Dhabi as a successful integration of education and technology. It has merged subjects such as history, geography and languages into a single subject – "social studies". It has also added subjects such as creative design, entrepreneurship and technology programming.

Existing subjects such as mathematics and Islamic studies have been modernised, and new books, including *My Vision* by HH Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, have been introduced in higher classes.

Older students debate these new subjects and books between themselves, with teachers simply observing, he said.

"But there have been challenges," he

pointed out. "A scarcity of teachers, and also of Arabic textbooks. We rely on some texts from the developed world, from the West, that we translate to fit our context," he added.

"We had to gather all relevant parties and build a diversified team. The public and private sectors came together to support this. We needed artificial intelligence platforms to support all this."

He also stressed that education was the key to diversifying the economy. "When it comes to education and future foresight, we have to think of future skills. And, through our results to date, we feel we are on the right track."

Lebanon's Minister of Education Elias Bou Saab agrees that using technology can make curricula more intuitive, more engaging, more empowering and more efficient.

"We need to put schools on trial. They haven't changed in the past 150 years. There is no consideration for individuality."

HE Dr. Talal Abu-Ghazaleh, chairman of the Arab States Research and Education Network (ARSEN), said that people today live in two parallel worlds – the 'natural one' and the 'virtual' one.

"The virtual world is the real one. Our economic and social problems could all be solved through a radical shake-up in education and a new knowledge era. The digital citizen is the

future. If you are not a digital citizen, you are not part of this world.

"Finland and Jordan have a similar population. But Finland has a GDP of \$180bn, and Jordan \$38bn. Why? Because 40 years ago, Finland decided to create and sell knowledge and we decided to buy it.

"Today we want to create wealth – and wealth comes from knowledge."

However, according to Tony Wagner, expert in Residence at Harvard University's new Innovation Lab, knowledge is now a commodity – which is necessary, but not sufficient.

"We no longer have an economy based on knowledge. Nobody really cares how much you know – Google can tell you everything. What's important is what you do with it."

He argues that in future schools, skills will matter more than knowledge, and that the four core skills for the future are critical thinking skills; the ability to collaborate; the ability to communicate; and the ability to solve problems creatively.

Prasad Ram, moderator and founder and CEO of Gooru, a non-profit education start-up, explained how his organisation was harnessing technology to make education more student-orientated. "Today, education is all about the destination. But it should really focus, on the student, and the journey." 📖



The Arab Reading Challenge ... The Future of Knowledge

The highly successful \$3m Arab Reading Challenge, launched by HH Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, in the UAE last year, aims to double its reach to at least seven million students in its second edition.

A part of that plan is to reach out to more children in Arab countries according to Aiman Amin Jarrah, Deputy Secretary-General of the Arab Reading Challenge. He said that while the political situation in the region had hampered the reach of the initiative in the Challenge's

first edition, the five-year plan is to encourage participation from at least half of the Arab countries.

"We have to reach out to them no matter where they are, no matter how, and no matter whether by traditional or digital books," he added.

The momentum already built up by the initiative would be sustained through activities such as awareness campaigns, road shows, book orders and the recently announced reading law in the UAE according to Muna Al Kindi, Manager of the first edition of the Arab Reading Challenge.

Under the law – announced earlier

this year by UAE President HH Sheikh Khalifa bin Zayed Al Nahyan, reading material will be exempt from fees and taxes. The government will provide a "knowledge briefcase" to the families of new borns, while employees will also be given time off to read specialised literature at work. The law is also hoped to encourage the private sector to invest in the establishment of libraries and cultural centres.

Al Kindi added that reading initiatives such as the Arab Reading Challenge have contributed in charting the 10-year National Strategy for Reading, which began this year. ↗

Youth... The Future With Arab Youth Ambassadors

Saeed Al Remeithi, member of the Federal National Council (FNC) and Chairperson of the Young Parliamentarians Forum in the Inter-Parliamentary Union, attributes the high unemployment rates among graduates in the region on their desire to only work in the government sector.

"We need to move away from this thinking that if there is no monetary reward in a job, there is no point," he said.

The UAE and most of the other GCC countries are currently focused on increasing employment of their citizens – especially the youth – in the private sector through various nationalisation schemes.

In a move to further reach out to and motivate the nation's youth, the UAE also appointed its first Youth Minister earlier this year. In October 2016, HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, launched a new national agenda for youth, which envisions young people playing a larger



role in the country's economy by providing them with education and leadership opportunities to increase productivity.

Al Remeithi also urged the younger generation in the region to expand their career options into different areas. While education is important for a successful career, he stressed that youth should step out of the mentality of getting a qualification to merely land a job.

"I was discouraged from going into politics because it wasn't the norm. There was a mindset that the youth

were not ready for such a role. But I believed in my goal and succeeded."

He added: "My aim is to enhance the parliamentary culture in the UAE as far as our youth is concerned."

Ousha Salem Al Suwaidi, Senior Developer at the Experts and Consultants Office, Family Development Foundation, also urged the region's youth to be more open to new ideas.

"Now, more than ever, a culture of entrepreneurship should be encouraged among our youth," she said. ↗

Knowledge and the Future of Health

Daniel Kraft, a Stanford- and Harvard-trained physician-scientist, inventor, entrepreneur and innovator, believes technology will change the “whole premise of healthcare”.

New innovations through wearables and monitoring apps will mean a new focus on preventative medicine.

“Smartphones today are healthcare platforms. They connect the dots between doctors, between patients and pharma.”

The next big step, according to Kraft, would be the Uberisation of healthcare where an innovative start-up connects the dots to create an app that can link you with a doctor at a press of a button. New wearables, such as contact lenses that can measure blood sugar, are building terabytes of data.

“The big challenge is what do we do with this data?” he said, envisioning a future where wearable information is compiled and integrated into our healthcare records, and artificial intelligence systems can make a diagnosis or tell us when to take medication.

“Artificial intelligence won’t replace doctors, but it will augment them,” he said.

However, Kraft admits there are challenges surrounding privacy and who owned and could use that data.

Hugh Herr, Associate Professor, Media of Arts and Sciences, Health Sciences and Technology, MIT Media Lab, also highlighted regulatory hurdles in his specialisation – bionics.

“Bionics is the design of constructs attached to or inside the body that extend human capability,” he said. “This can mean restoring abilities to the disabled, but it can also take humans way beyond their normal capabilities.”

As a double amputee who lost both legs below the knee in a climbing accident, Herr said he was living proof and that through bionics he now climbed better than before the accident.

Advances in technology could help treat blindness, paralysis, repair organs and tissue and regenerate the spinal cord, he said.



Daniel Kraft, a Stanford- and Harvard-trained physician-scientist, inventor, entrepreneur and innovator, believes technology will change the “whole premise of healthcare”

“The next big step, according to Kraft, would be the Uberisation of healthcare where an innovative start-up connects the dots to create an app that can links you with a doctor at a press of a button. New wearables, such as contact lenses that can measure blood sugar, are building terabytes of data.”

“Technology has freed me from the shackles of disability,” he said. “And I firmly believe, in the next decade, we will largely solve paralysis.”

Mohamed Ghoneim, Professor Emeritus of Urology at Mansoura University, Egypt, predicted advances in nanotechnology and biotechnology would transform healthcare.

He said nano-particles were being used to target and eliminate cancer cells and robotic surgery was being

miniaturised to replace major incisions with tiny holes.

Gene therapies are also offering treatments for conditions including Type 1 diabetes, he said. However, he believes the most promising area is stem cells, which could eventually be the key to treatments that reverse ageing.

Advances in this area could limit immunosuppression issues and overcome ethical issues related to embryonic stem cells, Ghoneim argued. †



A Journey to the Future

Jason Silva, host of National Geographic's *Brain Games* and creator of the web series *Shots of Awe*, believes the search for knowledge and the acquisition of knowledge defines the human condition and that technology is the embodiment of human imagination.

"Technology is the human mind turned inside out," said the media artist and TV personality as he detailed some of the trends that inspired the *Shots of Awe* series.

These included biotechnology and the ability to "systematically repair DNA" so humans might be able to

double or triple our lifespans.

Silva expressed his belief that artificial intelligence could augment, extend and uplift the human condition and how genetics, nanotechnology and robotics could transform our lives.

"Imagine what doesn't exist yet," he said. "Dubai is a fantastic example of this, conceived in the mind and brought into existence."

Among the more interesting ideas he presented were how we should strive to constantly update and innovate. Using the example of smartphone applications being updated every two days,

he said we should strive to achieve the same constant updating for everything.

One of his more interesting thoughts was that robotics and artificial intelligence could see humans become no longer necessary in a number of job roles. However, this was not a negative as humans would not become secondary, but our values and how we fill our time might change.

He suggested technology advances could mean we are able to take care of each other and reduce the number of people that are hungry or homeless.

They could also mean people are able to embrace their creativity rather than doing a job they don't like. Silva painted a picture of a future where people create virtual realities that others can pay to access and other unimagined job roles.

"If people need to fill their life with a job just to occupy their time we have to have a larger conversation about what it means to be human beings," he said.

“Silva expressed his belief that artificial intelligence could augment, extend and uplift the human condition and how genetics, nanotechnology and robotics could transform our lives. “Dubai is a fantastic example of this, conceived in the mind and brought into existence.”



Jason Silva, host of National Geographic's *Brain Games* and creator of the web series *Shots of Awe*

Media and Making the Future

Is media making the future or is the future going to give us a different type of media?

"I think its both, media is influencing the future and the future is influencing the media. Technology has transformed how we learn things and do things and discover things. We are trying to adapt to it but the change is so fast and adapting is the name of the game but change is never easy or going to be enough."

Ali M. Jaber, Dean of American University and group TV director at MBC.

"My father used to say of something he was sure of that he'd 'read it in the newspapers.' But of course, newspapers back then filtered news through trained journalists. Now it is: 'it must be true, I saw it on the Internet.' Unless people educate themselves on how to filter this, it's a problem."

Riz Khan,
TV reporter.

"The things you hit like on as they reinforce your world view tell the algorithm on Facebook to give you more of that."

Jason Silva, host of National Geographic's *Brain Games* and creator of the web series *Shots of Awe*.

"We thought 20 years of everybody communicating with each other would somehow bring us together but it hasn't." **Brandon Stanton**, photographer and creator of popular blog *Humans of New York*.



The Arab Knowledge Index

The Knowledge Summit 2016 concluded with the year's updates to the Arab Knowledge Index, an initiative by MBRF.

The Arab Knowledge Index 2016, now in its second year, was released as a companion document to the latest Arab Reading Index.

In the 'Updates of the Knowledge Index Press Briefing' the various authors of different sections of the report gave their insights into how the methodology had changed and also revealed areas where they had encountered difficulties in obtaining information. The Knowledge Index team consisted of Dr Han Torky, a UNDP Chief Technical Adviser;

Najoua Ghriss, Professor at the Higher Institute of Education and Continuous Training in Tunisia; Youssef Sadik, Professor of Sociology, Head of the Department of Educational Fundamentals, Mohammed V University; Yousry Elgamal, Former Minister of Education in Egypt; Dr. Motaz Khorshid, Former Minister of Higher Education and Scientific Research in Egypt; and Dr. Khalid Wazani, Economist and Strategy and Knowledge Advisor at MBRF.

In 2016's study, the Gulf Cooperation Council (GCC) countries generally ranked higher than other Arab countries on all sectoral indices.

Within the Index, the UAE ranked

first in five sectors – TVET (Technical Vocational Education and Training), higher education, economy, ICT (Information and Communication Technology) and RDI (Research Development and Innovation). Qatar ranked first for pre-university education, while the performance of Comoros, Djibouti, Libya, Somalia, Syria and Yemen was overall poor.

"Needless to say, some of these countries have been suffering from unstable social, political and security conditions for several years, while others are achieving low economic growth," the report points out.

Progress was seen from 12 countries in pre-university education, four



in TVET, two in ICT and one in RDI. Bahrain, Qatar, Saudi Arabia and the UAE were particularly noted for making advances in several fields.

The 2016 study noted strong links between development and political, social and economic stability and suggests current conditions in some countries could have serious consequences in terms of knowledge and development.

The Knowledge Index also suggested there was an urgent need for Arab and international efforts to assist these countries in overcoming their crises.

It also called for “comprehensive and objective” diagnosis of existing gaps in knowledge and of the root causes behind them and noted the important role the Index can play in monitoring countries’ progress and providing data for their development visions.

One particularly notable comment came from Professor Youssef Sadik, who referenced the results of the 2015

“ Within the index, the UAE ranked first in five sectors – TVET, higher education, economy, ICT and RDI. Qatar ranked first for pre-university education, while the performance of Comoros, Djibouti, Libya, Somalia, Syria and Yemen was overall poor. ”

Programme for International Student Assessment (PISA) study released earlier that month.

The PISA study measured 540,000 15-year-old students in 72 countries, including 15,000 from the UAE, for science, reading, maths and collaborative problem solving.

“In our Arab countries I can imagine an 8th grade Singapore student is as knowledgeable and skilled as a university student in the Arab world and this should bring us to focus on the inputs of this data,” Sadik argued. “These students joining the higher education

system, their skills are a lot less than elsewhere in the world.”

Scores on the Knowledge Index’s Higher Education Index varied from 8.39 for Somalia at the bottom to 61.44 for the UAE at the top. But it was noted that none of the Arab countries scored more than 65.

“Irrespective of the disparity in scores, all countries in the Arab region, including those with top rankings need to do more to develop their educational systems in order to draw level with the average quality of systems around the world,” the report notes. †



2016 was the Year of Reading in the UAE, and it created numerous initiatives to spread the love of reading and the acquiring of knowledge.

READING TAKES CENTRE STAGE

Last year reading was the centre of focus in the UAE and further afield in the Arab world. In December 2015, His Highness Sheikh Khalifa bin Zayed Al Nahyan, President of the UAE, declared 2016 as the Year of Reading. The central aim of the Year of Reading was to prepare a national framework that promotes reading among Emirati generations, in a quest to create a generation of book lovers and lifetime readers.

HH Sheikh Khalifa told Emirates News Agency (WAM): "We gave our directives that the year 2016 be the Year of Reading because reading is the basic skill for a new generation of scientists, intellectuals, researchers and innovators. Establishment of a knowledge-based economy and changing the path of development is based on science and innovation. This requires nurturing a generation of readers that are fully aware of developments happening around them in the world, as well as of the best ideas and the latest theories."

HH Sheikh Khalifa also underlined the importance of reading in broadening one's intellect and knowledge, as well as in promoting tolerance, openness and intercultural communication.





The highly successful Arab Reading Challenge was launched by HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai.

Earlier that year in September, His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai, launched the Arab Reading Challenge in a bid to encourage students in the Arab world to make reading a part of their daily routines. The Arab Reading Challenge aimed for a million students in the Arab world to read 50 million books, which was to be achieved through an integrated system for supervising students throughout the academic year.

During the launch of the Arab Reading Challenge, Sheikh Mohammed said that the Arab world was currently going through a reading crisis, and the numbers were shocking. "The Arab region has one of the lowest numbers when it comes to reading. This results in the Arab world falling behind in knowledge, and falling behind in civilization and intellect is something that we are witnessing every day in the Arab world. The Arab Reading Challenge is the first step we are taking concerning the issue, and we hope it will have an impact in the long term," said Sheikh Mohammed, according to WAM.

As it turned out, the Arab Reading Challenge was a phenomenal success. It turned into the largest knowledge-related Olympiad in the Arab world with the participation of more than 3.5 million students from different schools in the Arab world who read more than 150 million books.

At the Knowledge Summit 2016, which is organised annually by the Mohammed bin Rashid Foundation (MBRF), it was announced that the second edition of the Arab Reading Challenge aims to double its scope by enlisting at least seven million children in the region. If the second edition's aims were met, it would mean 350 million books read.

The Year of Reading was also an unqualified success. The initiative contributed to a momentous shift as more than 1,500 initiatives engaged segments of society in reading, according to Mohammad Al Gergawi, Chairman of the Higher Supervisory Committees for Year of Reading and Minister of State for Cabinet Affairs and the Future.

Prominent achievements during the Year of Reading involved the launch of the National Reading Policy (2016–2026) that is based on the vision of making reading a daily habit in Emirati society by 2026. The policy comprises 28 national initiatives that will be implemented in education, health, culture, community development, media and content. National targets for reading until 2026 include raising reading rates to 80 per cent among students and 50 per cent among adults, and raising the national output of content from the current 400 books per year to 4,000 books in 2026.

Perhaps the most prominent feature of the policy was the National Reading Law, issued in November

2016. The law, the first of its kind in the country and region, introduced a legislative framework that aims to support the development of human capital and building knowledgeable communities in the UAE. This 10-year plan will be supported by AED100 million to make reading a habit among the Emirati population. HH Sheikh Mohammed said: "The strategy of reading is a road map for building reading and a civilised society, keeping abreast of changes, leading in development and accepting all cultures. There is no knowledge economy without knowledge societies."

A further hugely successful initiative was the Reading Nation campaign held during Ramadan. Launched by HH Sheikh Mohammed, the aim was to distribute five million books to children in refugee camps and schools around the world. The target was two million books for refugee children, two million for more than 2,000 school libraries around the world, and one million to support educational programmes run by aid organisations.

This target was greatly exceeded with more than AED80 million in donations raised to provide more than 8.2 million books.

Despite these successes, it became clear that there was very little concrete information about the state of reading in the Arab World. This was addressed in September 2016 when MBRF, in collaboration with the United Nations Development Program (UNDP), announced the launch of the Arab Reading Index in line with the Year of Reading 2016. "Arabs are not giving their justified right in international surveys. According to the last one by UNESCO, Arab citizens are reading only half a page per year, which is saddening," MBRF Managing Director Jamal Bin Huwaireb said at the time. The survey was expected to reach a sample of at least 20,000 people and measure reading habits based on three factors: reading level, reading environment and personal habits.

When the results of the Arab Reading Index were announced in December at the Knowledge Summit 2016, it turned out around 148,000 individuals from 22 Arab countries has participated. The Index also revealed that an Arab individual reads an average of 35 hours a year, of which 15 hours are allocated to readings that relate to work or studies and 20 hours allocated to free-time reading. That debunked the myth that Arabs only read six minutes a day as suggested by some previous studies. MBRF and UNDP had previously launched the Knowledge Index to monitor the status of knowledge in the Arab world annually. Together, the two indexes deliver information that is scientifically gathered, statistically relevant and therefore provides a sound source of information for policy makers.

As His HH Sheikh Mohammed tweeted at the successful conclusion of the Year of Reading: "The UAE has selected creativity and innovation as pathways to progress. The pillar of this creativity lies between the covers and pages of the book."✈

BRIDGING THE KNOWLEDGE GAP

Globally failing to learn how to read has emerged as a critical problem, and ending illiteracy is one of the Millennium Development Goals

GLOBAL ILLITERATE POPULATION



757,000,000

15% of the world's population is illiterate

ADULT ILLITERATE POPULATION

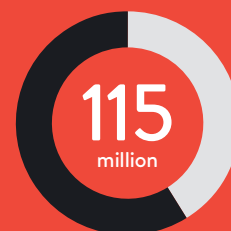


 **63%** are women (age > 15)



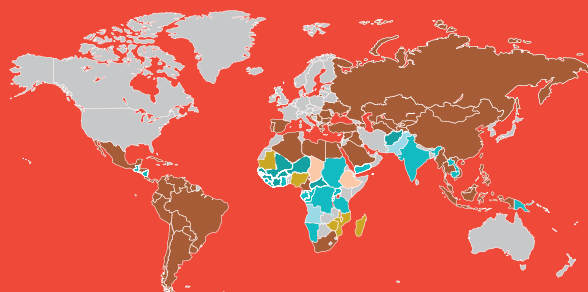
Not being able to understand the instructions on a medicine bottle is a scary thought.
1 in 5 adolescents and **1 in 5** adults in Europe lack the literacy skills to do so.

YOUTH ILLITERATE POPULATION



 **59%** are women (age 15-24)

YOUTH LITERACY RATE



 80% to 89%
  70% to 79%
  90% to 100%
 Less than 50%
  50% to 59%
  60% to 69%
 No Data

FICTION AND FACTS

What is science fiction for one generation is sometimes the reality of the next.



In many ways, science fiction writers are futurologists as they imagine technologies that have not been invented yet. They sometimes get it wrong, but often their predictions are truly inspired. In fact, they may even have a hand in shaping the future as their ideas are turned into reality by a generation who grew up reading their stories. As futurist Ross Dawson has observed, "Fiction about the future whets our appetite for new technologies. It is how we discover what it is we truly want, driving new developments." As the pace of change continues to increase, a statement by scientist and sci-fi author Isaac Asimov rings truer than ever: "It is change, continuing change, inevitable change, that is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be."

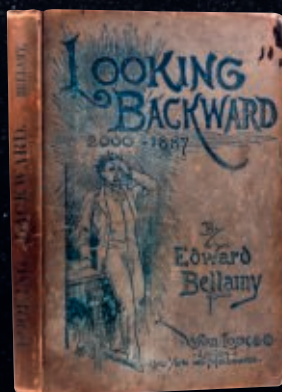
Today, we don't think twice about doing most of our monetary transactions with debit and credit cards. That idea first saw light in Edward Bellamy's 1888 novel *Looking Backwards*, where the citizens of his future world carried a card that allowed them to spend "credit" for goods and services without paper money changing hands. It took until 1950

Below: Edward Bellamy's 1888 novel *Looking Backwards*, introduced the concept of credit cards.

before the first credit card, the Diners Club Card, was introduced and there are now an estimated 10 billion debit and credit card transactions annually.

Jules Verne was one of the most inventive and prolific sci-fi writers of the 1800s. In *20,000 Leagues Under the Sea* (1870) he set his story on an underwater ship called the *Nautilus* that was powered by electricity. The first submarine to use electricity was launched in 1897, but Verne's vision was only truly realised with the launch of the nuclear-powered *Nautilus* in 1954. However, it his book *From the Earth to the Moon* that predicted many aspects of the 1969 manned lunar landing of Apollo 11. Besides both space ships consisting of aluminium capsules launched from Florida, Verne did remarkably accurate calculations as to the amount of force that would be needed to propel the rocket out of the Earth's atmosphere. Somehow, he also predicted that astronauts would experience weightlessness, a fact that was unknown at the time.

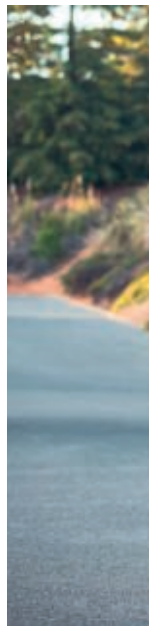
In 1911, Hugo Gernsback wrote a serial called *Ralph 124c 41+*, which included a device called the "telephoto" that allowed people to see others





Above: Ralph 124c 41+ included a device called the "telephoto" that allowed people to see others while speaking across long distances.

Above right: Star Trek's Medical Tricorder, which scans a person and gives a diagnosis without touching the body.



while speaking across long distances. The first demonstration of consumer video conferencing came at the 1964 New York World's fair where AT&T wowed the public with its "picturephone". Since 2003 we have had Skype on our computers and smartphones, while Apple's FaceTime was launched in 2010.

Equally prescient was Arthur C. Clarke who wrote a manuscript in 1945 called *The Space Station: Its Radio Applications*. It posited placing satellites in Earth's orbit at a height that would keep them locked to the same spot on the surface. The first geosynchronous satellite was launched in 1963 and today they are still the keystone of the global communications network ranging from telephone calls to satellite television and the internet.

Clarke took his status as visionary even further in 2001: *A Space Odyssey*, which was made into the famous movie directed by Stanley Kubrick. One of the most notable depictions in the film is the large, low Earth orbiting, revolving space station. Although the shape is different, today's International Space Station follows the same orbit and is also permanently manned by an international crew. The flat-screen computer monitors that were unheard of in 1968 are now commonly used. The film was also the first to envision in-flight entertainment, which is now standard on most airlines. Furthermore we have DVDs, iPods and computers with e-mail access, similar devices to the ones Clarke postulated.

2001: *A Space Odyssey* was also famous for HAL, a computer with artificial intelligence

(AI) that was voice controlled. The introduction of software like Siri on the iPhone 4S has taken voice control mainstream, while the growth in AI has been rapidly accelerating. In 1997 IBM built the famous chess-playing computer Deep Blue that beat champion Garry Kasparov. Today, with the explosion of cloud computing and the Internet of Things, most everything has an IQ. According to the consultants McKinsey there are 30 million internet-connected devices in the world. Advancing AI technology will soon give these devices "brains" of their own. Google's photo sharing service Picasa can recognise faces and suggest tags accordingly, while the Google Goggles mobile app helps to identify many foreign objects – from landmarks to logos. Google Instant uses AI to guess what a person is searching for as they type keywords into the search box.

The concept of the internet itself can be attributed to a number of science fiction writers. In a *Logic Named Joe*, written in 1946 by Murray Leinster, every house has a Logic (a computer with a screen) that accesses a network of information for the home user. The Logic is not a mere terminal as it communicates and interacts with the network.

However, it was John Brunner's 1975 novel *The Shockwave Rider* that was the most accurate. Not only did he foresee a huge computer network, he also introduced the ideas of identity theft, hacking, computer viruses and computer warfare, which have all unfortunately been realised.

William Gibson created the word "Cyberspace" in a 1982 short story, as well as the



Above: 2001: *A Space Odyssey* was also famous for HAL, a computer with artificial intelligence (AI) that was voice controlled



terms “netsurfing”, “neural implants”, “Virtual interaction” and “the matrix”. He even postulated that education would be moved online. In 1995, he identified the advent, evolution and growth of the internet as “one of the most fascinating and unprecedented human achievements of the century”.

The Star Trek franchise writers have also come up with some original ideas that have been turned into reality. Engineers at Stanford University are developing the Medical Tricorder, which scans a person and gives a diagnosis without touching the body. The researchers believe that their microwave and ultrasound detection system will be more portable and less expensive than other medical imaging devices such as MRI or CT, and safer than X-rays. Meanwhile, the Xprize is running a \$10 million competition to develop a Tricorder device that will accurately diagnose 13 health conditions and capture five real time health vital signs, independent of a health worker or facility. The prize will be awarded in early 2017 to one of two finalists that have already been shortlisted.

The science fiction TV series also popularised the replicator, a machine that can reconstitute matter and produce everything that is needed out of pure energy, no matter whether food, medicines, or spare parts are required. Today 3D printers are fulfilling a similar function as mainstream technology and have a range of impressive and important capabilities (including shaping prostheses or making organs). However, they do not create material “ex nihilo” (out of

nothing), but instead, like regular printers, must use already pre-existing corporal material.

The series also introduced the PADD (Personal Access Display Device) in the 1980s. This portable handheld information device, which was used by Starfleet crewmembers, became reality in 2010 with the introduction of the iPad. In actual fact, you can transform your iPad into a PADD by downloading the official *Star Trek* app.

Star Trek also popularised the concept of ‘universal translators’ that allowed alien species to communicate with one another. We might not be communicating with aliens yet, but Google Translate, which is at home on any computer or smartphone, offers translations in 63 languages and 3,906 language pairs.

One of the biggest technological revolutions we are currently witnessing is the development of the driverless car by companies ranging from Google to Ford and General Motors. This idea has been around at least since 1930 when Michael Breuer in *Paradise and Iron* wrote about a vehicle with no steering wheel and gear-shift lever that automatically took passengers to their destinations with no human input. Movies such as *Logan’s Run* in 1976 further developed the idea of driverless ‘pods’.

When George Orwell wrote *1984* in 1949, the concept of a dystopian state monitored by an interconnected web of security cameras seemed absurd. Fast-forward to the 21st century and it is estimated that London has around 500,000 CCTV cameras, which equals to one camera for every 14 Londoners. However, not even Orwell imagined nanny cams, GPS tracking via mobile phone, satellite surveillance and electronic eavesdropping by organisations such as the American National Security Agency (NSA). Sometimes fact is stranger than fiction. ↑



Above: The concept of “universal translators” allowed alien species to communicate with one another.

Top left: Goggle’s self-driving car.

Below: PADD was a portable handheld information device used by Starfleet crewmembers.



EXPLORE

RISE OF THE GREEN ROOF



A new legislation in San Francisco mandates that all new buildings incorporate green roofs. How will green roofs impact urban environments and what are their benefits?

A landmark legislation is set to make San Francisco the greenest city in the United States of America. The San Francisco Planning Commission recently passed a legislation mandating that all new construction projects must have green or solar roofs on at least 15 to 30 per cent of their roof space. The legislation now just needs the city council's approval – which it will most likely get – to come into effect. If things go as planned, the policy will be implemented by January 2017.

This is the first legislation of its kind in the USA. “Rooftops are one of the last untapped environmental resources in our growing city, and we need to be strategic about how we activate these spaces,” said San Francisco Supervisor Scott Wiener. The green roof legislation builds on the city's existing solar rooftop policy that requires 15 per cent of the roof space on buildings with 10 floors or less to be set aside for solar panels.

WHAT IS A GREEN ROOF?

Simply put, a green or living roof is growing plants on the rooftops of buildings. Roofs are upgraded to incorporate high quality water proofing, root repellent and drainage systems, filter cloths, lightweight growing mediums and, of course, plants. Green roofs can be modular with plants planted in movable, interlocking grids or they can be built up where required.

Green roofs are not only aesthetically pleasing but offer a host of environmental benefits. If implemented on a large scale, green roofs can help in landfill diversion through the use of recycled materials in the growing medium. Green roofs play an important role in stormwater management as water is stored by the substrate and then taken up by the plants from where it is returned to the atmosphere through transpiration and evaporation. In summer, depending on the plants and depth of growing medium, green roofs retain 70–90 per cent of the precipitation that falls on them; in winter they retain between 25–40 per cent. Furthermore, runoff water is filtered. Through the daily dew and evaporation cycle, plants on vertical and horizontal surfaces are able to cool cities during hot summer months and reduce the Urban Heat Island (UHI) effect. The light absorbed ➤

by vegetation would otherwise be converted into heat energy. Roofs tend to be the hottest surfaces in urban environments and covering them with vegetation brings down the heat. This, in turn, prolongs the service life of heating, ventilation, and HVAC systems through decreased use.

Cities with green roofs also show improved air quality as the plants naturally filter noxious gases, trap air borne pollutants and reduce the occurrence of dust and smog typically by between 10 and 20 per cent. It is also worth noting that green roofs can reduce electromagnetic radiation from wireless and mobile devices by up to 99 per cent. Green roofs also have excellent noise attenuation, especially for low frequency sounds. An extensive green roof can reduce sound from outside by

40 decibels, while an intensive one can reduce sound by 46-50 decibels.

Perhaps the greatest benefit of green roofs is the energy efficiency they offer. Roofs are the sites of greatest heat loss in the winter and highest temperatures during summers. Research by the National Research Council of Canada found in 2003 that green roofs can reduce the daily energy demand for air conditioning in the summer by over 75 per cent.

GREEN ROOFS AROUND THE WORLD

Germany is thought to be the leader in global green roof technology and usage with 12 per cent of all its roofs green. In 2015, France passed legislation stipulating that new buildings in commercial zones must be partially covered by plants or solar panels. Paris is currently embarking on a greening programme of planting 20,000 trees, adding one million square metres of green roofs and walls and creating large amounts of new green space to reduce urban heat island effect. Washington D.C. is aiming for 20 per cent green roof coverage by 2020. In July this year, Cordoba became the first city in Argentina to call for green roofs on new constructions. In 2009, green roofs were made compulsory on all industrial and residential buildings in Toronto. The Green Tokyo Plan of 2000 requires that new buildings greater than 1,000 square metres green at least 20 per cent of their useable roof space.

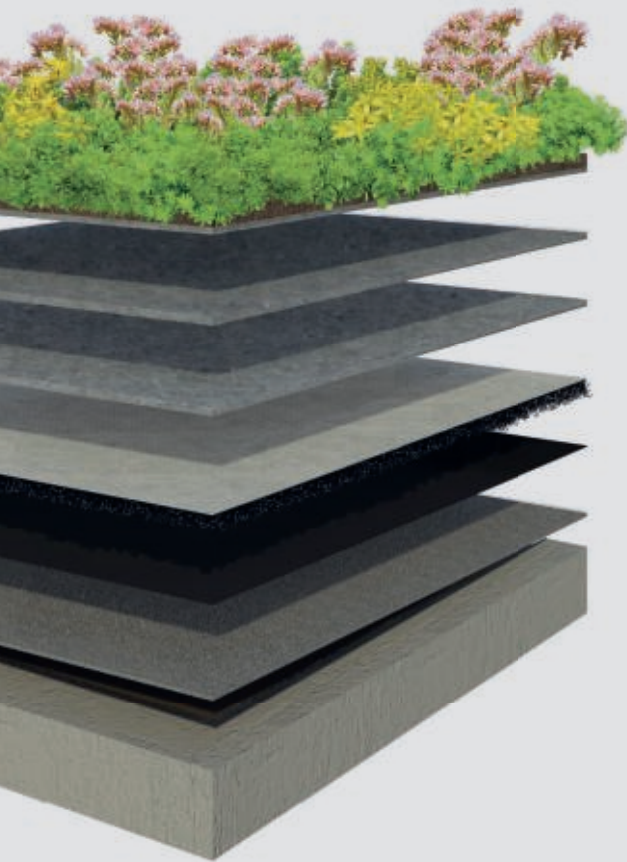
In Singapore, the green roof initiative is not limited to new buildings only. The Green Roof Initiative by Singapore National Parks (NParks) encourages owners of existing buildings to green their rooftops with 50 per cent of the installation costs being taken care of by NParks. Countries like Singapore have shown that, with limited space and a fast growing population, green infrastructure both horizontal and vertical is essential to attracting and retaining talent. The Sustainable Growth Strategy for Singapore targets 0.8ha of green space for every 1,000 persons and aims to increase greenery in high-rise buildings to 50ha by 2030.

Globally, green roofs are a multi-billion dollar industry. In 2015 the value of the North American green roof market was estimated to be \$130.1 million and reflected 18.5 per cent growth year on year; \$946.4 million in Asia Pacific (covering Japan, India, China, South Korea and Australia) and \$3.6 billion in the UK, Germany and France.

GREEN ROOFS IN MENA

Environmentalists believe green roofs in the Middle East and North Africa can address many of the major environmental concerns of the region. According to a 2013 MENA renewable energy status report, energy demand in the region has risen by 15 per cent. With

FUNCTIONAL LAYERS OF TYPICAL EXTENSIVE GREEN ROOF



6

5

4

3

2

1

1. Roof deck, Insulation, Waterproofing
2. Protection and storage layer
3. Drainage and Capillarity Layer
4. Root Permeable Layer
5. Extensive Growing Media
6. Plants, Vegetation



heating and cooling being a reason for the increasing demand on fossil fuels, there is enormous opportunity for investment in green roofs as a way to stabilise or reduce energy consumption in the MENA region.

With over half of its population residing in urban areas, the urban heat island effect in MENA is a cause of great concern. UN projections estimate the MENA population will reach 430 million by 2020, of which 280 million are expected to be urban. According to the United States Environmental Protection Agency an urban area with a population exceeding one million may be 1 – 3°C hotter in the daytime and up to 12°C warmer in the evening than surrounding areas. Green roofs can be instrumental in combating the potential heat effect these urban areas will have, especially as research conducted in Dubai has found green roofs can have a cooling effect ranging from 2C to 4C in the peak of summer. MENA's concrete architecture backed by structural soundness makes it ideal for a green roof implementation.

In a trailblazing scheme in 2009, Dubai Municipality launched an initiative where the roofs of all buildings and houses in Dubai would be greened. The roofs would be irrigated with the condensate water of air conditioners. UAE's capital Abu Dhabi includes green roofs as one of the principal recommendations under its Estidama sustainability programme. The UAE benefits from having both legislations and infrastructure supporting green roofs in place already. What remains now is for action from government, corporates and private home owners.

However, things move very quickly in the UAE. In August 2015 Dubai Electricity and Water Authority (DEWA) urged home and building owners to take



advantage of its Shams Dubai smart initiative to install photovoltaic (PV) panels on rooftops to produce solar energy and connect it to DEWA's grid. As of October 2016, 222 buildings were connected with a capacity of over 6 megawatt (MW). The Shams Dubai initiative is an integral part of the Dubai Clean Energy Strategy 2050 to transform Dubai into a global hub for clean energy and green economy, and to provide 75 per cent of Dubai's energy through clean sources by 2050. With the right support, green roofs could see the same rapid growth as Shams Dubai. ♡

Above: Installing a modular green roof.

Top: Heatherwick Studio unveiled plans to build a 15-acre tree-covered mountain in the middle of Shanghai.





FIVE FUTURE TRENDS

*Technology creates great opportunities, but it can also disrupt.
We take a look at five technologies that are set to transform our lives.*

Professor Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, has been at the centre of global affairs for over four decades. He is convinced that we are at the beginning of a revolution that is fundamentally changing the way we live, work and relate to one another. According to him: “The First

Industrial Revolution used steam power to mechanise production. The

Second used electric power to create mass production. The Third

used electronics and information technology to automate production. Now a Fourth

Industrial Revolution is building on the Third. It is characterised

by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres.”

The possibilities of billions of people connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge, are unlimited. And these possibilities will be multiplied by emerging technology breakthroughs in fields such as artificial intelligence and robotics, driverless vehicles, 3-D printing, the Internet of Things, and virtual reality. We take a look at these five technologies and how they will impact our lives.

ARTIFICIAL INTELLIGENCE AND ROBOTS

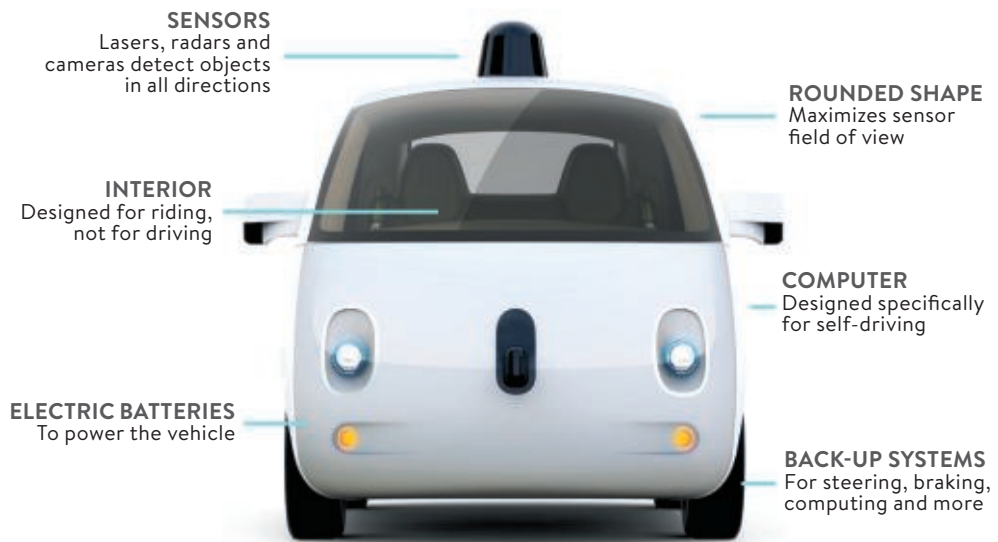
The question of how close we are to artificial intelligence (AI) depends on its definition. We are many decades away from self-aware machines such as the

Terminator from the movie franchise. However, AI is increasingly climbing behind the wheel of driverless cars and nudging smartphones to get smarter.

Siri, Google Now, and Cortana are all intelligent digital personal assistants on various platforms (iOS, Android, and Windows Mobile). AI is important in these apps, as they collect information on your requests and use that information to better recognise your speech and serve you results that are tailored to your preferences. Many websites now offer customers the opportunity to chat with a customer support representative while they’re browsing – but not every site actually has a live person on the other end of the line. In many cases, you’re talking to a rudimentary AI. AI is also being increasingly deployed to do groundbreaking research into cancer, wildlife preservation, and cybersecurity.

According to a recent study by McKinsey & Company, the robotics and AI sector will create an economic value of \$8 trillion by 2025, through its impact on different sectors. The UAE is well aware of the fact that the robotics and AI sector represents a major investment opportunity. As a result the country launched the UAE AI & Robotics Award for Good as part of the National Innovation Strategy. The international winner receives \$1 million and the National winner AED1 million.

AI and robotics has many applications, and therein is both the promise and the threat. Manufacturing are the first places where robots and automation have eliminated human jobs, but it’s hard to think of an industry that will be left unaffected as robots and AI become more affordable and widespread. It’s estimated that between 35 and 50 per cent of jobs that exist today are at risk of being lost to automation. Repetitive, blue collar type jobs might be first, but even professionals – including paralegals, diagnosticians, and customer service representatives – will be at risk. ➤



DRIVERLESS CARS

The age of the driverless car is drawing closer. The US Secretary of Transportation stated at the 2015 Frankfurt Auto show that he expects driverless cars to be in use all over the world within the next 10 years. Johann Jungwirth, Volkswagen's appointed head of Digitalization Strategy, expects the first self-driving cars to appear on the market by 2019. Toyota plans to bring the first models capable of autonomous highway driving to the market by 2020 while Mark Fields, Ford's CEO, announced that the company plans to offer fully self-driving vehicles by 2021.

Morgan Stanley recently predicted the large-scale adoption of autonomous cars could produce global savings of around \$5.6 trillion. In the US alone there were 30,800 fatal car crashes in 2012, which calculated in loss of life, medical treatment and work loss costs totalled \$317 billion. There could also be some gains in productivity as commuters' time is freed up, plus untold environmental benefits through increased fuel efficiency and potentially

lower levels of vehicle ownership if driverless cars hasten the trend towards ride sharing. The rise of autonomous cars could also mean the death of parking lots and garages in cities. If robot-taxis are always on the move, there simply won't be a need for tons of parking.

Dubai is well aware of these positive factors and estimates by 2030 25 per cent of the emirate's vehicles will be driverless. It is expected driverless vehicles will have a significant impact on the economy and the daily lives of residents, by reducing transportation costs by \$245 million, saving people 396 million hours on the road, and reducing road accidents and associated economic losses by 12 per cent. In September, Dubai's RTA trialled the EZ10, a driverless electric shuttle.

Although driverless cars are still at a nascent stage of evolution, their advent may cause many jobs to change or disappear entirely in the next 20-30 years – from taxi drivers, to truck drivers, from auto-retailers to agricultural workers. There are currently 3.5 million people employed as truck drivers in the US alone. If driverless cars catch on, US car sales could plunge 40 per cent in the next 25 years, Barclays analyst Brian Johnson wrote in a report last year. General Motors and Ford Motor Co., he added, would have to cut their combined number of assembly plants in the US and Canada to 17 from the current 30. Some 25,000 auto workers would lose their jobs. Governments and insurance companies will have to produce new regulations, especially as there will be no more driver liability insurance with the advent of driverless cars.

Above: The layout of Google's driverless car, which has already completed thousands of kilometres in test drives.

Below: Driverless cars will be built for passenger comfort, with the steering wheel only there for emergencies.





3D PRINTING

According to tech research company Gartner we are in the beginnings of a “Digital Industrial Revolution” that threatens to reshape how physical goods are created and 3D printing is at the heart of it. 3D printing represents a revolutionary type of manufacturing where 3D printers build things by depositing material, typically plastic or metal, layer by layer until the final product such as iPhone cases, jewellery, shoes, parts for jet engines, prosthetic limbs and many more are finished. According to Canalsys, a market research firm, the global market for 3D printers and services will grow from \$2.5 billion in 2013 to \$16.2 billion in 2018, a CAGR of 45.7 per cent. Factors such as 3D printing evolving from developing prototypes to end-user products, mass customisation, production of complex parts, government investments in 3D printing projects, and improvements in manufacturing efficiency are expected to drive the growth of the 3D printing market.

Dubai is a first mover in this regard. In July 2016 His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, launched the ‘Dubai 3D Printing Strategy’, a unique global initiative that aims to exploit technology for the service of humanity and promote the status of the UAE and Dubai as a leading hub of 3D printing technology by the year 2030.

In May, Dubai unveiled the world’s first 3D-printed office, which took only 17 days to print. The 3D-printed office was constructed using a special mixture of cement and a set of

building material designed and made in the UAE and the United States. The Dubai Media Office said that the use of 3D printing in the emirate’s construction sector will account for 25 per cent by 2030, up from 2 per cent in 2019. The 3D printing strategy is estimated to add \$300 billion to the world economy by 2025.

However, 3D printing will also make intellectual property theft easier, which Gartner estimates will result in the loss of at least \$100 billion by 2018. Another contentious side is bioprinting of life-saving 3D printed organs and tissues. Although a boon to humanity, government regulations are not yet in place to deal with this medical breakthrough. ➤



Above: In 2016, Dubai unveiled the world’s first printed office.

Below: 3D printing allows artists to move from concept to final product in record time; Dubai estimates that 3D printing will account for 25 per cent of the emirate’s construction sector in 2030.



THE INTERNET OF THINGS

The Internet of Things (IoT), consisting of sensors and actuators connected by networks to computing systems, has received enormous attention over the past five years. According to a new McKinsey Global Institute report linking the physical and digital worlds could generate up to \$11.1 trillion a year in economic value by 2025. At the top end, that level of value – including the consumer surplus – would be equivalent to about 11 per cent of the world economy.

The Internet of Things revolves around increased machine-to-machine communication; it's built on cloud computing and networks of data-gathering sensors; it's mobile, virtual, and instantaneous connection. This includes everything from cellphones, coffee makers, washing machines, headphones, lamps, wearable devices and almost anything else you can think of. This also applies to components of machines, for example the jet engine of an airplane or the drill of an oil rig. The analyst firm Gartner says that by 2020 there will be over 26 billion connected devices.

On a broader scale, the IoT can be applied to things like 'smart cities', which can help us reduce waste and improve efficiency for things such as energy use. Precision farming equipment with wireless links to data collected from remote satellites and ground sensors can take into account crop conditions and adjust the way each individual part of a field is farmed. Manufacturing processes

studded with a multitude of sensors can be controlled more precisely, raising efficiency. In health care, sensors and data links offer possibilities for monitoring a patient's behaviour and symptoms in real time and at relatively low cost, allowing physicians to better diagnose disease and prescribe tailored treatment regimens.

The impact of the IoT was not lost on Dubai and it announced a Smart Dubai move in March 2014 with the mission to make the emirate the smartest city in the world by 2017. Dubai already has in place innovative programmes for data sharing and analytics, smart mobility solutions for traffic control, and a smarter grid programme for better management of power and water consumption. The city is also developing smart health services, a smart police force and other mobile-enabled e-government services, and in the years ahead it can be a leading example of how smart city strategies need to evolve.

These initiatives are paying for themselves. For every AED1 that is spent by the Smart Dubai Government (SDG), AED5.4 is saved by the Government, with over AED4.3 billion being saved in total from 2003 to 2015.

However, the IoT also has a downside. The interconnected nature of devices, their sheer volume and generally lax inbuilt security make them particularly vulnerable to attacks, which tend to have large tangible outcomes.

Above: By 2020, it is estimated there will be more than 26 billion connected devices.

VIRTUAL REALITY

This technology holds the promise to be even more transformative than the World Wide Web was — reaching into every segment of every market and remaking it to be virtually accessible. Market studies suggest that the consumer virtual reality market will be worth anywhere from \$1bn this year to \$5.2bn in 2018, and even \$15.9bn by 2020.

The essence of Virtual Reality lies in opening doors to another physical world. Known as telepresence, this experience causes you to focus diligently on your existence inside the virtual environment and forget your physical surroundings. Virtual reality is already helping teachers bridge the gap between what's taught in the classrooms and what's out there in the real world. VR will allow potential tourists to visit a place or wander through a hotel before physically being there. Virtual Reality is being used to treat Posttraumatic Stress Disorder (PTSD) in war veterans, and surgeons are now being trained using surgery simulators, allowing them to visualise accurately human anatomy and surgical procedures via VR headsets.

VR is set to revolutionise the way we go shopping in virtual malls. The entertainment industry may suffer as VR will enable people to virtually attend music concerts or sporting events. The



film industry will make movies more immersive than ever, but at the same time people could choose to watch the film from home.

One thing is for sure, our lives are set to change as never before. ♪



Above: Virtual Reality allows us to transcend our physical presence. Below: In the near future people will be able to attend fashion shows using Virtual Reality.



THE MILLENNIAL SHOPPING FORCE

The retail scene is changing as never before as millennial shoppers make more of their purchases online.

There is no exact agreement which years the millennial generation covers, but in most cases it denotes the generation born between 1982 and 2004 (also known as Generation Y). The millennial generation is so named because this demographic cohort was born near the dawn of the new millennium. However, what makes the millennial generation unique is that it is the most numerous generation ever (there are 80 million millennials in the US alone), and the first born into the digital world – specifically the internet and social media. Technology is incorporated into their everyday lives, and has been a major contributing factor to the growth of Silicon Valley as a technology hub. In other words, the millennial generation has a huge impact in shaping technology trends, and nowhere is their impact felt more than in the retail sector.

The latest research makes this clear. An annual survey by United Parcel Service (UPS) of 5,000 online shoppers in the US found that for the first time, consumers say they bought more of their purchases on the web than in stores. The shoppers now made 51 per cent of their purchases on the web compared with 48 per cent in 2015 and 47 per cent in 2014, according to the survey by UPS and analytics firm comScore Inc. The latest results of the survey – now in its fifth year – illustrate the degree to which the adoption of online shopping is accelerating. This year, 44 per cent of smartphone users said they made a purchase from their device, up from 41 per cent a year ago. The shoppers reported that only 20 per cent of their purchases were made in a store the conventional way – going to a store, browsing there and buying – down from 22 per cent a year ago. Forty-two per cent chose to search and buy entirely online, while the rest said their purchases were made by combining online and in-store shopping and browsing.

Millennials are driving this shift. The 18-34 age group is now making 54 per cent of its purchases online, up from 51 per cent last year. “The millennial impact is critical. It is the driving force behind a lot of changes in retail,” says Neil Saunders, CEO of retail analysis firm Conlumino. According to Forbes, the purchasing power of millennials is estimated at \$170 billion annually.





➤ Accenture conducted market research on the shopping behaviours of 6,000 consumers, of which 1,707 were Millennials, across eight countries. The company found that retailing would change more in the next five years than it has in the last 50. That's due to the fact that consumer uptake of new communication technologies has continued to compress over the past 125 years. Accenture points out that radio took more than 30 years to achieve a consumer adoption rate of 50 per cent. Mobile phones took only 15 years to reach the same level, and social media, a mere 3.5 years.

One of the areas most affected by millennial shopping patterns is clothing. According to Goldman Sachs older millennials (ages 25 to 34) are more likely than any other generation to spend most of their clothing budget online. The report states that: "an additional \$50 billion of sales will migrate online over the next four years, a revenue base equivalent to apparel and accessories sales for Macy's, Nordstrom and Kohl's in all channels combined. At that rate, online penetration of the apparel and accessories category will reach 25 per cent in four years, with further adoption across the age and income spectrum."

According to Goldman's research, nearly 35 per cent of millennials already spend most of their apparel budget online. That compares to roughly 30 per cent for those between ages 35 and 44, and closer to 15 per cent for those between 45 and 54.

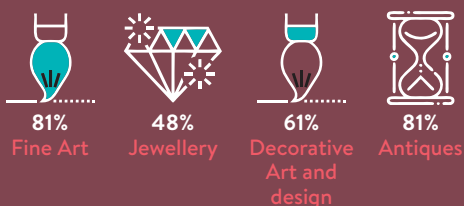
That millennials are willing to buy their clothes

online is not surprising. After all, they can go into a shop, check out the items they like, find the cheapest price online and order. What is surprising is that millennials are also upending the art, jewellery and antiques markets, which have traditionally relied on expert personal advice and the physical inspection of items.

According to *The Hiscox Online Art Report 2016*, online art market sales reached \$3.27 billion, up 24 per cent in the last 12 months. In 2013, the online art market was worth just \$1.57 billion, and it is expected to grow to \$9.58 billion in 2020. As expected, millennials are the trendsetters in this segment as well. The report found that 46 per cent of millennials had bought art online, with 19 per cent making their first ever art purchase online in 2016 (up from nine per cent in 2015). Forty-nine per cent of millennials were repeat buyers and made between two and five purchases in the last year. Of these, 68 per cent expect to buy more in 2017, while 27 per cent say they will buy the same amount.

What exactly are they buying? Eighty-one per cent buy fine art, 61 per cent decorative art and design, 48 per cent jewellery and 35 per cent antiques. They aren't shy of spending money either, with most transactions found between \$1,000 to \$5,000. They are also savvy shoppers, with their top three social media influencers being museums, artists and galleries through platforms such as Instagram, Facebook and LinkedIn.

WHAT DO MILLENNIALS BUY ONLINE?



19%

Made their first ever art purchase online (up from 9% in 2015) highlighting just how important the online art market is for first-time buyers in this age group

TOP THREE REASONS FOR CHOOSING A SPECIFIC ONLINE ART PLATFORM



Quality



Searchability/navigation



Reputation

TOP THREE REASONS WHY MILLENNIALS WOULDN'T BUY ONLINE



Physical Inspection: Worried that the work will look different in real life



Quality: Not enough information provided about quality



Condition: Not able to inspect the physical condition

A study commissioned by Invaluable found similar results with nearly a quarter (22.7 per cent) of art buyers finding new works of art via social media, which edged out museums (20 per cent) and galleries (15.9 per cent) as buyers' primary source of discovery. Millennials are leading this change, with 44.3 per cent of young millennials (ages 18–24) and 33.8 per cent of older millennials (ages 25–34) saying they discover art on social media. Millennials are also increasingly buying art online, viewing the purchasing of art as both a long-term investment and a unique experience.

In addition to viewing art as a good investment, most of the millennial art buyers surveyed (92 per cent) cited “some kind of feeling” as a motivating factor to buy art. And how do sellers effectively communicate a feeling to millennials? Through social media. According to Simon Davies on Tech.Co: “Instagram has emerged as a more democratic platform for art, offering unparalleled access to those whose pockets are not as deep as their enthusiasm for art. It also allows serious collectors and critics to discover and evaluate art without bias. In a sense, the platform strips away reputation and fanfare, instead forcing artists to connect with people in a visually engaging and innovative way.”

Millennials are the driving force changing the brick and mortar retail scene. As they become increasingly affluent, this change will only accelerate. ↑



THE WAY MILLENNIALS BUY ART

- They don't just snap up works of artists from Instagram, but rather use social networks to connect and get to know those art creators and sellers.
- They understand the importance of networking and use the connections they create to better understand their options.
- They like to do their own research, and they can often be even more aggressive when it comes to seeing artwork they're interested in.
- They feel comfortable purchasing art online but without saying no to buying art offline either.
- They do not minimize the importance of understanding what they buy and from whom.
- They are more willing to take risks, compared to traditional collectors.
- They are adepts of art flipping, reselling artwork not for financial growth, but for expanding their personal collection.
- They stay in touch with artists and galleries from all over the world through social media, because they crave for direct connections.
- They see in Instagram and Facebook the perfect way to create meaningful connections.
- They always purchase artwork that has a meaning to them, even though they might not always fully understand the references and historical importance of particular artworks.
- They want to know more and to get actively involved in this world that they are about to embrace.

WHAT COULD HELP CONVINCE YOU TO BUY ONLINE?



Condition report of artworks

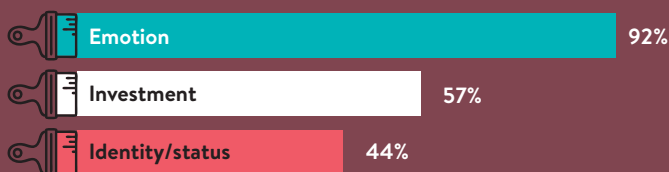


Certificate of authenticity

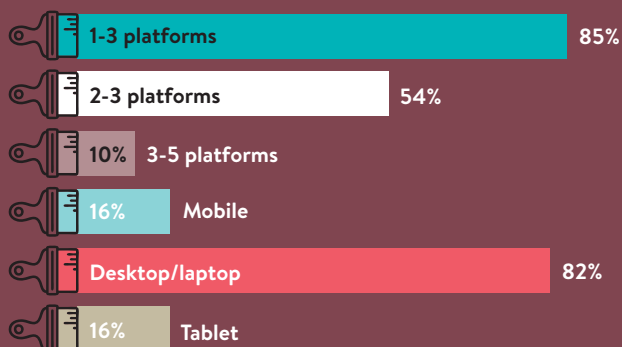


30-day return guarantee

WHY DO THEY BUY ART?



NUMBER OF PLATFORMS BOUGHT FROM AND WHICH DEVICES USED





THE NEW WEAPON AGAINST ZIKA:

GMO MOSQUITOES

Scientists plan to use genetically modified mosquitoes to battle Zika.

As the most efficient transmitter of disease in the animal kingdom, mosquitoes cause more than a million deaths a year. Mosquitoes are among the most dangerous animals in the world as they are the primary vectors for major human diseases such as yellow fever, malaria, Zika and dengue fever, which together infect hundreds of millions of humans worldwide. According to the World Health Organization more than 50 per cent of the world's population is presently at risk from mosquito-borne diseases.

Yet out of the world's 3,500 species of mosquito, the Zika virus and other major deadly diseases such as dengue, chikungunya, and yellow fever are spread by just one species – *Aedes aegypti* – the Asian tiger mosquito. The mosquito is found in tropical and sub-tropical climates around the world – in Africa, the Americas, the Eastern Mediterranean, Southeast Asia and the Western Pacific. It breeds prolifically in pools of stagnant water, and as it mainly feeds during the day mosquito nets are practically useless. *Aedes* has also become increasingly resistant to insecticides.

However, in what could be a major breakthrough, early next year millions of modified *Aedes aegypti* mosquitoes will be released in parts of Brazil and Colombia in an attempt to combat mosquito-borne diseases. Scientists will infect the mosquitos with the *Wolbachia* bacterium, which impacts their ability to spread viruses to people.

Wolbachia is a naturally occurring bacterium that infects 60 per cent of insect species, but does not harm human beings. *Wolbachia* was first identified in 1924 during dissections of household mosquitoes. Interest in the bacterium waned until the 1970s, when researchers noticed that under certain circumstances it could prevent mosquito eggs from hatching, which suggested the bacterium could be used for insect control. In the 1990s scientists learned that some strains of *Wolbachia* could also shorten insect life span, which presented another way to limit disease transmission by insects.

However, the bacterium does not occur naturally in *Aedes aegypti*, but after extensive research over the past few decades, scientists have now found a way to inject *Wolbachia* into the mosquitoes. Initially the idea was to disrupt the Asian tiger mosquitos' breeding patterns and reduce their lifespan. Yet the biggest breakthrough came when it became clear that the dengue virus was unable to replicate in infected mosquitoes' bodies. *Wolbachia*-harbouring mosquitoes

also display lower Zika viral prevalence and intensity and, critically, do not carry infectious virus in the saliva, suggesting that viral transmission was blocked. Researchers at the University of Wisconsin-Madison recently confirmed that. As a result the plan is now to release the *Wolbachia* infected mosquitoes to spread the disease to wild mosquitoes. If *Wolbachia* works against Zika and dengue, chances are it should work against related viruses like Japanese encephalitis and yellow fever.

Entomologist Scott O'Neil, who spearheaded the research that discovered how to infect *Aedes aegypti* with *Wolbachia*, is heading the revolutionary \$18 million project. An international team of donors including the Bill and Melinda Gates Foundation as well as local governments in Latin America, the USA and the UK backs the project. The debilitating Zika virus has been reported in 61 countries around the world and is linked to nervous system malformations in babies.

The great thing about infecting mosquitoes with *Wolbachia* is that you only have to do it once. If a

Below: Mosquitoes infected with *Wolbachia* are being used in the fight against dengue fever.





Above: *Aedes aegypti* mosquitoes spread the Zika virus, as well as dengue, chikungunya and yellow fever.

Right: Mosquitoes infected with *Wolbachia* are released into the wild.

Wolbachia-carrying male fertilizes the eggs of an uninfected female, or if only the female is hosting the *Wolbachia* bacteria, all future generations of mosquitoes will be infected. As the mosquitoes breed, those with *Wolbachia* become predominant without the need to release more contaminated insects.

Small-scale trials in Brazil, Colombia, Australia, Indonesia and Vietnam have shown that modified mosquitoes can reduce the spread of dengue fever to humans. When tens of thousands of these mosquitoes were released near the small city of Cairns in northern Australia in 2011, the bacteria spread rapidly among local *Aedes aegypti* mosquitoes and 90 per cent of mosquitoes

in a targeted area were infected within weeks. Tests in Indonesia and Vietnam found similar success.

Other scientists are also testing *Wolbachia* to control mosquitoes. In Singapore, officials plan to release male *Aedes aegypti* mosquitoes infected with a strain of *Wolbachia* that renders their offspring infertile. A US biotechnology company is seeking approval to use a similar approach to combat the related Asian tiger mosquito (*Aedes albopictus*), which carries dengue and chikungunya. In Guangzhou, China, scientists are already releasing millions of *Aedes albopictus* mosquitoes infected with *Wolbachia* each week, in large-scale field trials. Researchers in French

1947
first identified
in rhesus monkey
in Zika forest,
Uganda



1 FEB 2016

ZIKA
declared a Public
Health Emergency
of International
Concern by WHO

1/3
of reported cases
of **microcephaly** in
Brazil linked to ZIKA





ZIKA IS HERE TO STAY

In November 2016, the World Health Organization (WHO) declared that Zika would no longer be treated as an international medical emergency. The lifting of the nine-month declaration means that the disease is here to stay. Zika was first reported in human beings in 1954 in Nigeria. Prior to 2015, only small outbreaks were reported in Africa, South East Asia and the Pacific Islands, none of which were considered a major threat to human health. In February 2016, WHO had declared Zika to be a global health emergency after noting a link between Zika's arrival in Brazil last year and a surge in the number of babies born with abnormally small heads. Thirty-nine countries and territories in the Americas have been affected by the Zika epidemic, and it is expected that at least four million people will be infected by the end of the year.

Polynesia are trying the same strategy on another species of tiger mosquito. Although the results of the trials are promising, scientists caution that we cannot rely solely on genetically modified mosquitoes to combat Zika and dengue. Standard measures such as vaccines, insecticides and public measures to control mosquito breeding sites will have to be continued.

"It is unclear whether or not such an approach could work in the field and there are many hurdles that still need to be overcome, but in the absence of an effective vaccine, it could prove to be a powerful weapon to limit the spread of Zika and other serious viruses," says Professor Jonathan Ball, a virus expert at Nottingham University.

The research on the use of *Wolbachia* against dengue fever and Zika causing viruses began in 2008. However, it wasn't made public till researchers were sure that *Wolbachia* would not infect humans and other domestic animals. Although the initiative is under fire from environmental activists, the US Food and Drug Administration has given the trial its seal of approval.

According to Scott O'Neil, his research indicates that *Wolbachia* may even work against malaria, but since malaria is carried by an entirely different genus of mosquito, the *Anopheles*, he would have to start an entirely different line of infected females. †

2.17
billion people
live in areas
conducive to
ZIKA transmission



8 out of 10
infections are
asymptomatic



4 million
ZIKA infections
in the Americas
in 2016

EXPLORE

SUPERSONICS TO BOOM AGAIN



Supersonic travel is making a comeback with the first flight set to take off in less than a decade.

It is not often that technology moves backwards. Supersonic passenger flight, as glamorised by Concorde from 1976 to 2003, is the memory of yesteryear. Fuel costs, a fading safety record, an ageing fleet and a price tag which had left ticket prices beyond the reach of the average passenger all combined to consign it to history. Yet while everything is getting faster, from internet download speeds to online shopping deliveries, passenger aeroplanes still traverse the world at the same speeds of between Mach 0.8 and 0.9 (800 to 900km/h).

The good news is that supersonic travel is back on the aviation radar. The first mover in this regard is the collaboration between Virgin Galactic and Boom Technology. In November, the two companies unveiled their prototype of a passenger plane that will fly at Mach 2.2, more than twice the speed of a typical commercial jet. That is also faster than the Concorde, which had a maximum speed of Mach 2.04. It was pulled out of service in 2003, but come 2023, the golden era of transatlantic supersonic flights could once again be a possibility for air travellers. Even better is that ticket prices are slated to cost the same as a business class seat.

Denver-based Boom Technology's prototype supersonic jet is named the XB-1 Supersonic Demonstrator (pictured). It looks the part as it bears a close physical resemblance to the erstwhile Concorde. It is only one-third of the size of the actual passenger plane planned for the future, earning it the nickname Baby Boom. Its first test flight is expected to take off this year from Southern California.

"Sixty years after the dawn of the jet age, we're still flying at 1960s speeds. Concorde's designers didn't have the technology for affordable supersonic travel, but now we do," said Blake Scholl, CEO and founder of start-up Boom at the Baby Boom's launch. "Step-by-step supersonic air travel will become available for everyone," he continued. "It won't be a bucket-list purchase any more. There is a huge market and the margins are enormous."

Boom's fully developed aircraft will have a capacity of 44 passengers. The full-scaled XB-1 will fly at a speed of Mach 2.2, covering 2,335km per hour. This means passengers will be able to fly from London to New York in 3.5 hours, while Sydney to Los Angeles will take six hours instead of the usual 14. ➤





Above: Concorde epitomised the era of glamorous air travel.

Manufacturers say Baby Boom and XB-1 will have to fly at an altitude of 60,000 feet above sea level if they are to achieve supersonic speeds. The unprecedented speed promises not only shorter travel time but also unparalleled views. The lofty altitude combined with just a single row of seats on each side of the plane mean that passengers will be able to see the curvature of the Earth.

XB-1's most lucrative factor will be its price – supersonic travel will be available at just \$5,000. The lower price can be attributed to XB-1's relatively lower manufacturing cost. A composite carbon fibre body and super efficient engines will enable the XB-1 to reach the same speed as the Concorde for one fourth of the price. Boom speculates the fares may fall even further in the future. If things go as planned, the full scaled XB-1 will be in the sky by 2023.

The good news is that supersonic technology has moved on since the days of the Concorde. The X-15, developed for the US Air Force in the Sixties, is thought to be the fastest aircraft ever to leave terra firma – its rocket-powered design propelling it to a documented Mach 6.72, and the verge of space, in October 1967. NASA's experimental X-43 was even faster, ratcheting the dial to Mach 9.6 – but only as an unmanned rocket-boosted plane that had to be launched from atop an airborne B-52. The Boeing X-51, another mould-breaker still in the testing stage, reached Mach 5 in an unmanned flight in May 2010.

While the plan is ambitious and yet to be realised, Baby Boom already has the backing it needs – and first buyer as well – Richard Branson, CEO of Virgin Galactic. In a deal worth \$2 billion, Branson has already optioned 10 XB-1 aircraft, when they are built. There is also news of an unnamed European carrier optioning 15 jets.

Virgin's interest in Boom is not limited to acquiring the aircraft, but stretches to its development as well. The company is providing engineering and manufacturing services in addition to test flight

Did You Know?

Supersonic speed is measured in Mach, a velocity named after a scale developed by 19th century scientist Ernst Mach. Mach 1 implies that an object is travelling at the speed of sound while Mach 2 means it's travelling twice as fast the speed of sound.



support and operations. Scholl has managed to rope in other industry heavyweights as well to champion his supersonic jet: Boeing, American aerospace company Lockheed Martin, NASA, Elon Musk's space transport services company SpaceX and astronaut Mark Kelly on board as an adviser.

WAKE TURBULENCE AHEAD

While the prospects of supersonic travel are exciting, the path ahead has its fair share of hurdles. Boom hopes to reach speeds higher than Mach 2 and at these speeds, the biggest hurdle airplanes face is drag. The air resistance is so intense that aircraft travelling at Mach 3 will have to tolerate temperatures hundreds of degrees higher than those faced at Mach 2. The only way to combat this is to fly much higher in the atmosphere and perhaps shoot out into space and re-entering only for the landing.

Other concerns include the increased noise pollution the supersonic booms will cause and the limits some countries impose on supersonic flights. Worldwide, there is no standard for how loud a supersonic boom can be. Overland supersonic flight is banned in the United States and Europe, while other countries have prohibitions on booms reaching the ground and only allow flights up to Mach 1.15. If that can't be changed, a supersonic commercial airplane is an economic non-starter.

However, at the acclaimed Lockheed Martin's Skunk Works, aerodynamicists have created computer codes that made it possible to design a supersonic airplane with a much reduced sonic boom. The Defense Advanced Research Projects Agency paid for tests on an F-5 fighter that validated the low-boom codes.

SUPersonic SPURT

Despite the hurdles, hyper-speed passenger jets promise great financial returns if they can be run cost-effectively. With such lucrative rewards in sight,



Boom Technology is not the only company aspiring to travel faster than sound.

Boston-based Spike Aerospace is working on its S-512 Supersonic Jet that will fly at Mach 1.6. However, the 12-18 seat commercial plane is being planned as a luxury aircraft aimed at the private jet market. Spike says the S-512 will be in the air by the end of the decade.

Supersonic travel has also lured NASA with the space giant teaming up with Lockheed Martin. NASA's administrator Charles Bolden officially announced a new series of X-Planes in February 2016, which included a supersonic low-boom demonstrator that is set to fly in 2020. This demonstrator, built in collaboration with Lockheed Martin, will validate simulations and conduct real-life tests to measure the sonic boom over land.

In another marriage of technological expertise,

business clout and economic power, Nevada-based Aerion Corporation has tied up with Airbus to create a new Concorde.

Virgin and Boom are hoping to beat the competition to market as the aircraft uses existing technology that has already been approved by regulators. Rolls-Royce and other engine builders have already designed engines based on existing hardware, good for almost Mach 2 and acceptably quiet.

In the words of travel commentators Euromonitor, "Supersonic passenger air travel is back on the agenda of key market players who are determined to make it commercially viable for a wide consumer base. The challenge will be making the extraordinary work in the ordinary."

"While the first flights are likely to be on the busy transatlantic routes, there are over 500 future global routes open to supersonic travel, with trans-Pacific flights being key. ↑

Above: The cabin of the Spike Aerospace S-512, which will fly at Mach 1.6.

Above left: The cockpit of the Concorde was a tight squeeze.

Below: The Concorde was in service from 1976 to 2003.





THE DRIVEN INVESTIGATOR

Huda Zoghbi, a Lebanese-born medical scientist and pioneering neurologist at Baylor College of Medicine and Texas Children's Hospital, was recently awarded a prestigious Breakthrough Prize in Life Sciences.

That the 61-year-old Huda Zoghbi – who is now a professor at Baylor College of Medicine and the founding director of the Jan and Dan Duncan Neurological Research Institute at Texas Children's Hospital – won the Breakthrough Prize in Life Sciences can largely be attributed to factors beyond her control.

Zoghbi grew up in Beirut speaking Arabic, English and French. Her mother advised her to study biology in college, a classic pre-med field, rather than her first choice of literature. In 1975, Zoghbi entered medical school at the American University of Beirut, the Middle East's pre-eminent medical faculty. However, her education was disrupted six months later when civil war broke out in Lebanon. She lived a mile from campus, but even travelling that short distance quickly became too dangerous.

The following year her parents sent her to Texas for the summer. However, as the war in Lebanon intensified the country's airports and borders were shut and Zoghbi had to shelve her plans of returning home for her studies. Despite applying late in the year she gained admittance to Meharry Medical College in Nashville and graduated three years later in 1979. She then started a three-year residency at the Baylor College of Medicine.

At Baylor, Zoghbi became so fascinated with neurology that she moved from cardiology into pediatric neurology. "It was like a big puzzle," she says of her love for neurology, "but it had a certain logic to it. And I've always liked puzzles." Her change of field led to another three-year stint at Baylor, and it was during this time that circumstances led her towards a road with numerous medical breakthroughs ahead.

In 1983 she encountered two patients within the space of a week, both young girls, who were socially withdrawn, unable to speak and exhibited other similar symptoms. At that point Rett syndrome was relatively unknown and often misdiagnosed. Fortunately, Zoghbi found a paper in the *Annals of Neurology* that identified the disease her patients had. Sifting through records, Zoghbi found five more patients that had been misdiagnosed.

Today, Rett syndrome is known to affect 1 in every 10,000 females, which "makes it one of the most common causes of intellectual and developmental disabilities," says Zoghbi. "People become scientists for all sorts of reasons, such as science for science's sake," she explains. "I became one because I was heartbroken I had to tell parents nothing could be done about their child's disease, frustrated by the state of neurology at the time."

Zoghbi became convinced that Rett was caused by a genetic disorder, and that helping her patients would require identifying the gene. As this was outside her skillset, she began training as a molecular geneticist in 1985. "As a pediatric neurologist, I was at the top of ➤



my game,” reflects Zoghbi, “but in order to learn how to do basic research, I had to go to level 0. Even though I’d been out of medical school for six years, I still knew less than the other graduate students.”

Although Rett syndrome was her motivator, there was little data available on the disease. So she started her research by focusing on an even rarer degenerative brain disease, spinocerebellar ataxia (SCA), which affects 1 in every 100,000 people. This disease, which typically manifests itself in people after turning 40, causes problems with speaking, breathing, swallowing, balance and coordination that eventually leads to death.

Zoghbi ran tests on families affected by the disorder and it took her until 1993, eight years after she had started her research, to find that a mutation in a gene called SCA1 was the sole cause of the disease. The gene creates toxic levels of a protein called Ataxin-1 that causes the symptoms. She then bred mice with the same mutation so she could study the disorder as it progressed from first symptoms. Zoghbi and her Baylor colleague Juan Botas are now studying therapeutic approaches that might decrease

Ataxin-1 levels. If they can find a drug that can block the enzyme it could become a treatment for the devastating disease.

“These cells may have only 10 to 20 per cent more protein, but that little bit extra is enough to wreak havoc in the brain cells,” Zoghbi says.

Her research on SCA, along with the genetic techniques she learnt in the process, led to the identification of the Rett syndrome gene. Called MECP2, it creates a protein of the same name. Mutations in MECP2 are also responsible for other neurological disorders such as some forms of autism, other learning and intellectual disabilities and even juvenile schizophrenia.

“It’s been a long haul and many people told me I was wasting my time,” says Zoghbi. “I’ve been at it for 30 years now and it shows the importance of studying a rare but defined disease. You learn so much and you can apply the knowledge to a more common, heterogeneous disease. It’s only because of that effort that I can see a light at the end of the tunnel. I can now see a path towards interventions that could help my patients with SCA, Rett or other degenerative diseases.”

Insights gained from Zoghbi’s research

Above: Zoghbi with Google’s Sergey Brin at the Breakthrough Prize gala event.

are proving helpful in developing therapeutic targets for more common devastating diseases – Rett for autism and spinocerebellar ataxia for Alzheimer's.

"Sometimes rare diseases can really teach you something that's very helpful for more common diseases whose development and treatment has been elusive," Zoghbi said.

The application in Alzheimer's could yield the most dramatic benefits. In an example of the Goldilocks Principle, Zoghbi's team recently showed that stopping the build-up of a toxic protein, Nuak1, which makes the brain vulnerable to degeneration, prevented such symptoms in animal models. Zoghbi hopes a drug – multinational biopharmaceutical company UCB is currently developing one that she will test in mice – eventually can work in patients at risk of dementia in the same way that statins act to control the accumulation of cholesterol in the blood vessels of heart patients. "What we have is a potential druggable target for dementia," she said.

In her acceptance speech at the Breakthrough Prize ceremony, Zoghbi cited the deaths she witnessed as a young doctor. "I turned to research for answers, and today, together with collaborators and trainees we are charting new paths towards viable therapies," said Zoghbi. "It's thrilling to see we are beginning to understand the language of life and translate it to help mankind."

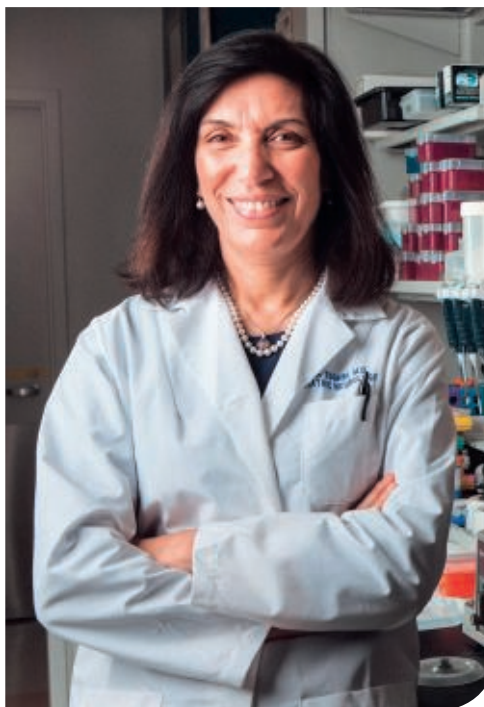
The Breakthrough Prizes are funded by Russian tech entrepreneur and investor Yuri Milner and his wife, Julia Milner; Facebook's Mark Zuckerberg and his wife, Priscilla Chan; Google's Sergey Brin and his former wife, Anne Wojcicki of 23andMe; and Alibaba's Jack Ma and his wife, Cathy Zhang. The Breakthrough Prizes, now in their fifth year, are the richest science awards on Earth. They are worth \$3 million to each



Above: Dr. Zoghbi with Ashley Fry, her first patient with Rett syndrome, in 1983.

winner, more than double the \$1.2 million that comes with the Nobel Prizes. The idea is that the money and celebrity status will inspire more young people to choose science as a career.

The prizes may give scientists a glimpse of fame, but celebrity has little appeal to Zoghbi. "Material things and limelight are fleeting, they come and go. You could give me all the money in the world to do another job and I wouldn't do it. I am working on something that will help people, and that reward is with you every day." f



WINNING RESEARCH

Garnering the Breakthrough Prize in Life Sciences is just one of the many recognitions for Huda Zoghbi's groundbreaking work. She has been elected to the National Academy of Sciences, the Institute of Medicine, and the American Association for the Advancement of Science. She has been named an honorary doctor of medical sciences by Yale University and was conferred honorary doctorates of science from Meharry Medical School, and Middlebury College. She has won another 24 awards, and it has been rumoured that she is in the running for a Nobel Prize in Medicine.



THE ORIGIN OF LITERATURE

Mesopotamia and Egypt created the first works of literature, putting the Middle East at the centre of one of mankind's most important legacies.

When ancient literature is mentioned many people seem to instinctively think of Roman and Greek writers. In fact, the term 'classical literature' generally refers to the literature of ancient Greece and Rome and writers such as Homer, Sophocles, Euripides, Catullus, Vergil and Ovid. However, literature began with the very invention of writing in the Middle East in Bronze Age Mesopotamia and Ancient Egypt.

One has to distinguish between writing and literary writing. Writing, such as the compilation of data and records is not the same as literary writing, which tries to provide entertainment, enlightenment or instruction. The first script appeared around 3500 BCE in Mesopotamia in 'pictographic' form as it was based on pictures, and evolved into 'cuneiform' – or wedge shaped – writing. Many examples of these early forms of writing have survived, but they generally deal with records, administration and laws.

The world's oldest piece of 'literary' writing is generally acknowledged to be the *Instructions of Shuruppak*, dated to between 2600 and 2500 BCE. Written in Sumerian, one of the languages of Mesopotamia, it is known as wisdom literature as it is intended to instil virtue and community values. It covers topics from the practical "You should not make a well in your field: people will cause damage on it for you," to the moral "Do not answer back against your father." The numerous copies found by archaeologists in clay tablet form attest that it was a popular piece of literature.

The oldest Egyptian literary writing, known as the Pyramid texts, have been dated to between

2400–2300 BCE. The spells, or "utterances", of the Pyramid texts are primarily concerned with protecting the pharaoh's remains, reanimating his body after death, and helping him ascend to the heavens.

Up to this point the authors of these works are lost in the mists of time. The Akkadian/Sumerian poet Enheduanna (2285–2250 BCE) is the world's first author known by name, as she was the daughter of Sargon of Akkad (Sargon the Great, 2334–2279 BCE). Besides being the world's first known author, male or female, she is credited with creating the paradigms of poetry, psalms, and prayers used throughout the ancient world, which led to the development of the genres recognised in the present day. These are found in her works *The Great-Hearted Mistress*, *The Exaltation of Inanna*, and *Goddess of the Fearsome Powers*.

Egyptologists consider the Story of Sinahue, the tale of an Egyptian palace official, as one of the most famous works and a prime example of Egyptian literature from Pharaonic times, dating around 1800 BCE. There is still much debate whether it is a factual account or a work of fiction. Due to the universal nature of the themes explored in 'Sinahue', including divine providence and mercy, its anonymous author has been described as the "Egyptian Shakespeare", and the numerous surviving fragments found by archaeologists throughout Egypt attest to the great popularity of this work. Its influence has survived, with Naguib Mahfouz, the Nobel Prize-winning Egyptian writer, publishing a short story in 1941 entitled "The Return of Sinahue". ➤

A clay tablet that recounts a part of the Epic of Gilgamesh





Above: *The Papyrus of Ani* is regarded as an Egyptian literary milestone dating back to 1250 BCE.

Below: A carving depicting the influence of Enheduanna, the world's first author known by name.

The Epic of Gilgamesh is regarded as the world's first epic poem, history's oldest known fictional story and the first bona fide example of literature. These Sumerian poems, dating back to 2250-2000 BCE, were individual pieces of writing that were later combined around 1800 BCE in the "old Babylonian" version. It is believed the complete epic covered 12 clay tablets. By that time, Sumerian literature already covered many forms such as narrative poetry of mythological content, heroic adventure (epic), love poetry, praise poetry, hymns and prayers, proverbs, contest poetry and moralising literature.

The Story of Atrahasis is a familiar one to modern readers as it concerns the creation of mankind by the gods. However, after mankind became too populous, rowdy and breaking divine ordinances the gods decided to wipe them

off the face of the Earth. As a result it rained for seven days and seven nights creating a great flood. However, mankind survives as the god Enki had ordered a man called Atrahasis to build a great boat that he filled with his family and every kind of animal. The Babylonian version of this story dates to 1700 BCE, but there is evidence that it originated much earlier in the Sumerian time.

The Papyrus of Ani is regarded as another Egyptian literary milestone. This papyrus manuscript with cursive hieroglyphics and colour illustrations dates back to 1250 BCE. It stands out for the fact that we know it was written by the Theban scribe Thani, making him the first recognised 'Egyptian' author. *The Story of Wenamun*, a travel story that was published 150 years later, is regarded as Egypt's first work of fiction.

The final great literary work to come out of Mesopotamia was *The Epic of Erra* written by a Babylonian priest named Kabti-ilani-Marduk in 900 BCE during a time of political confusion and regional war. This is exemplified by the god Marduk turning away from his city, angry with its people, thus leaving it to Erra's destructive wrath. This theme of the gods wreaking destruction was often repeated in classical Greek literature.

The Epic of Erra marked the end of Mesopotamia and Egypt's literary flowering as both empires fell into decline. However, by that point writing had crossed the Mediterranean and the age of Classical Antiquity had begun in Greece with the publication of the *Iliad* and the *Odyssey* in the 8th century BCE. In India writings were published in Sanskrit, and the Middle East's first works in Hebrew appeared. The first literary works, mainly focused on religion and philosophy, appeared in China around 1045 BCE, however only small fragments have been found. The earliest surviving Chinese literature dates back to the Qin Dynasty (221-206 BCE). This highlights that the world's first literary efforts were firmly based in the Middle East, a fact that is often forgotten. ♪



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