The Future is Now

Quarterly Emerging Trends Report

Q1 2018

The Future is Now, Quarterly Emerging Trends Report (Q1 2018)

First edition published in Japan
by the Asian Productivity Organization
1-24-1 Hongo, Bunkyo-ku
Tokyo 113-0033, Japan
www.apo-tokyo.org

© 2018 Asian Productivity Organization

The views expressed in this publication do not necessarily reflect the official views of the Asian Productivity Organization (APO) or any APO member.
All rights reserved. None of the contents of this publication may be used, reproduced, stored, or transferred in any form or by any means for commercial purposes without prior written permission from the APO.

We live in volatile times.

Disruptive technologies, changing demographics, evolving work models, political upheaval, and a protectionist stance toward global trade as marked by the UK Brexit and the US pullout from the Trans-Pacific Partnership have upended the status quo and left many feeling confused.

Worldwide, people are polarized by these trends. At one end of the spectrum, some are leaning toward these changes, championing them as steps in the right direction.

At the other end, some others feel disillusioned and discontented, with pervasive feelings of restlessness and uncertainty.

Amid the chaos and conflict, however, emerging trends are evident:

the exponential power of exascale supercomputing will crunch big data with the finesse to allow for meaningful insights and trend analysis; new supermaterials will be created which will forever change the way we live and work; disruptive financial-tech trends will transform the way trade is processed and bank transactions are conducted; and interfaces with AI will pave the way to hybrid production models between men and machines.

The APO is also on the cusp of change. Navigating this volatile, uncertain, complex, ambiguous environment, the Quarterly Emerging Trends Report, prepared by the APO Futures Team, seeks to distinguish the forces driving the shifts in times, technologies, and events. It is also trying to focus on predicting future trends that will improve the labor productivity and economic competitiveness of member countries.

We are casting our net far and wide in search of the emerging trends and underlying driving forces that will shape the future of the APO and its members. There are more questions than answers. The future is not predetermined, but one thing is certain: the APO is committed to working with its members to equip ourselves for a complex future.

Dr. Santhi Kanoktanaporn
Secretary-General
Asian Productivity Organization
April 2018

“Focus on signal over noise. Don’t waste time on stuff that doesn’t actually make things better.”

—Elon Musk, CEO of SpaceX and Tesla

Table of Contents

Exascale Supercomputing

The ever-increasing processing power of supercomputers has made collecting huge amounts of disparate, quantifiable data cheaper, faster, and genuinely beneficial to end-users.

With advances in big data analytics, it is possible to generate truly useful insights and information representations to justify critical decision making. Big data and the computing power required to process them go hand in hand. The world can now generate more data in two days than we did from the beginning of human civilization until 2003. This exponential increase in quantifiable data is accompanied by rapid booms in big data-pertinent software, hardware, and professional services expected to be valued at over *US$210B by 2020.*

With vastly expanded supercomputing power, big data and data analytics can now actually support real-time-relief and response efforts for communities in need. From the use of satellite images and crowd-sourced mapping tools deployed to predict and help prepare for disasters, to on-the-ground reports from drones, government emergency responders and NGOs can now rapidly adopt data analytics as a critical tool to strengthen early warning systems and aid relief efforts in the aftermath of disasters. With supercomputing power delivered through the IoT and pervasive computing, big-data real-time analytics offer extreme precision and high-resolution scenario projection to combat the environmental impacts of extreme weather, even as the world community addresses climate change.

On top of that, the race is heating up on the quantum-computing front. Quantum computers differ from conventional supercomputers in that they rely on quantum particle physics and run on subatomic particles such as positrons at near-zero Kelvin temperatures.

This fundamentally changes the way society views computing power, as

"Exascale computing power, undergirded by pervasive computing, IoT and Wireless Mesh Networks, seeks to shorten the achievement time of the Sustainable Development Goals and accelerate the creation of Society 5.0."

the same supercomputing strength will have substantially less carbon footprints and reap enormous benefits from big-data crunching, creating real-time scenario projections to facilitate well-informed decision making. Quantum-computing prototypes, however, are presently still unstable and prone to calculation errors.

For now, the supercomputing arms race will still be based on supercomputers with the highest floating point operations per second (flops). On this front, PR China is taking the lead, with Sunway Taihu achieving the ability to perform at 100 petaflops. With strong financial support from PR China's central government, the Sunway Taihu team aims to achieve the first exaflop supercomputer next year, effectively ushering in the exascale supercomputing era before 2020.

The emergence of exascale, and potentially zettascale and yottascale, computing in the next few years can be used to foretell the future and reconstruct the past with mathematical precision. On the climate front, the weather, earthquakes, and tsunamis could be predicted with superprecision. Below the surface of the earth, exascale computing could be used to identify geothermal structures and prove useful for the exploration of petroleum and natural gases, eliminating existing resource scarcity. Exascale computing power, however, ultimately depends on the achievement of program goals designed by humans. Deployed judiciously, it potentially shortens the time needed to reach many of the UN Sustainable Development Goals, particularly in the areas of addressing socioeconomic ramifications due to climate change, energy shortages, and environmental impacts, given the myriad supercomputing applications undergirded by pervasive ubiquitous computing and facilitated through self-evolving Wireless Mesh Networks and the IoT.

Hybrid Social Production

Manufacturing floors of the future will require more diversity than today in the sense that tasks will be carried out through a continuous feedback loop process involving humans and machines existing in both physical and virtual worlds.

According to the Singularity Hub, industrial robots and softbots that are autonomous and mobile will be able to perform multitask functions by 2029, including a high degree of self-correcting mechanisms for nonrepetitive production jobs.

The role of humans will take the form of "augmented humans." Human ability to interact with and intervene in production processes will be enhanced through wearable devices relying on a myriad of communication and info-sharing modes such as speech, facial expressions, gestures, etc., facilitated through massive arrays of multimodal human–machine interfaces. Idea generation, as well as planning and control functions of production processes, will be initiated and expanded by both natural and machine intelligence. Machines base their functionality on the preservation of historical production data and extrapolation to future enhancements in product quality, design, and specifications. Flexible production processes, making adaptive changes to products possible, will therefore ensure process efficiency and product quality.

"When human's mind can be replicated and maintained in a self-regulated and computationally based system, the human-machine chimera would yield unimaginable outcomes which go beyond mere interaction of two human beings. Appropriate governance between these two forms of intelligence would complement each other's strengths, eliminate their weaknesses and empower each other's capabilities, which eventually, will benefit the human Master."

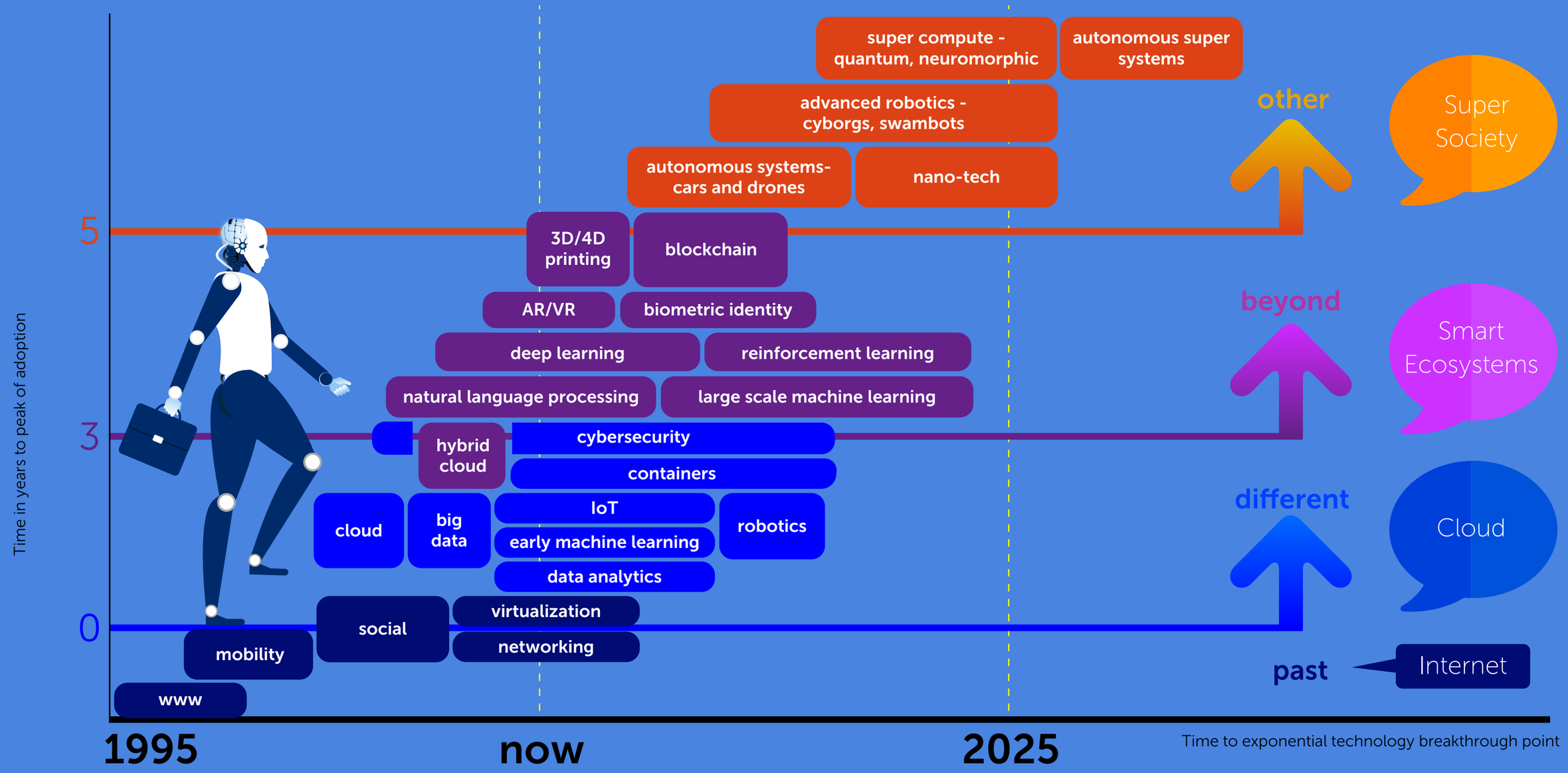
Less attachment to a physical location may be one of the consequences of the hybrid production model between men and machines. Production centers can be situated far away from core manufacturing units, yet maintain operational efficiency and reduce overall production costs. Thanks to advanced predictive analytics, production and distribution can now be matched with forecasts of availability of other inputs of production.

While the mass production model offered limited participation of customers in product design, the hybrid production model democratizes the market by taking into account customers' preferences. Customers are also regarded as a critical "human" element in the future hybrid production model where all information is collected and fed back continuously.

Prior to executing production, machines themselves will send information on a new product, which is based on the aggregated preferences of customers, to the customer base for "approval" through a middleware platform. This is the technosocio dimension of this production model due to socially embedded product preferences in addition to the involvement of "socialized machines."

Furthermore, resources will be allocated more efficiently only for the products in most demand since there is more alignment between product design and customer preference.

Horizons of technology disruption



Source: dimension data @mikequindazzi

Supercalifragilisticexpialidocious Materials

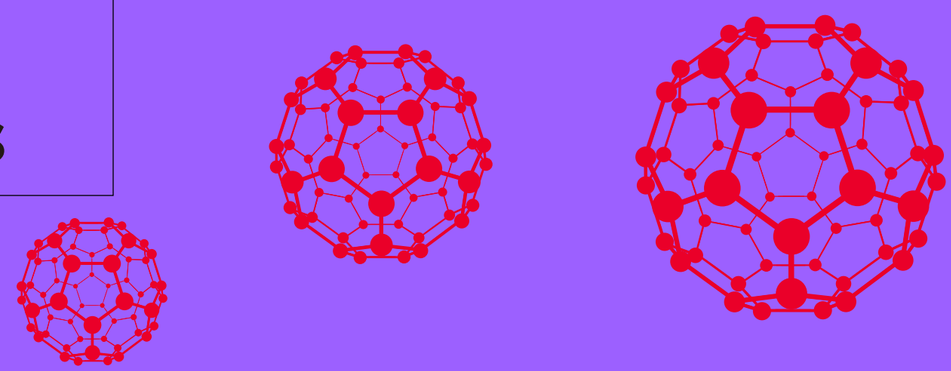
The tools we have developed to improve productivity have changed the way we work. None of us can now imagine working without the 4th utility (i.e., the Internet) and smartphones.

With emerging materials, which run the gamut from electroactive polymers (EAPs) to metamaterials and carbon nanotubes, we see ourselves not just shaping the tools that help us work better but also being forever changed by them.

Take, for example, *EAPs* that have been integrated into microelectromechanical systems (MEMS) to produce smart actuators in the electronics industry. EAPs are also being tested by the US Department of Defense to emulate the operation of biological muscles while possessing the perfect combination of superhuman brute strength with resistance to actuation strain and fracture. Combined with other materials such as *hygroscopic aerogel, amorphous metals, and metamaterials* (which owe their properties to structure rather than composition), a list of armaments such as microwave and 2D invisibility cloaks offers first-strike capabilities, pushing the limits of defense science.

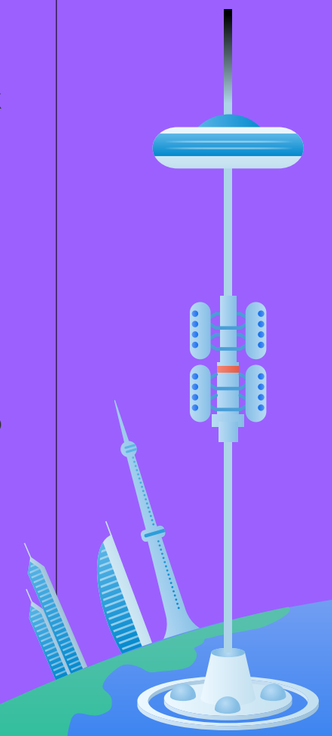
Futuristic *carbon-based organomaterials* also give rise to an evolving landscape: carbon nanotubes with remarkable physical properties, including ballistic electronic transport capabilities, point to the feasibility of building nanotube elevators into space, transporting electric currents and telecommunications signals, to space stations and geostationary satellites. Towers hovering hundreds of kilometers above the earth could be constructed given the high specific tensile strength of carbon nanotubes in the foreseeable future.

On top of that, amorphous fullerene will be widely used in the manufacturing industry in the near future.



> **"We shape our tools and, thereafter, our tools shape us."**
>
> —John Culkin (1967)

Manmade diamonds used in knives and oil drills may be strong, but aggregated fullerene-based nanorods have even greater physical strength (e.g., higher isothermal bulk modulus). As material science technology becomes more sophisticated, we may eventually transition to a fullerene age, when the diamond age finally bites the dust. The materials that superenhance productivity in the manufacturing industry will evolve as material science and engineering continue to create "supercalifragilisticexpialidocious" (to quote Mary Poppins, the beloved British nanny of children's fiction) materials. The more important question will be: *how will we let these tools shape us?*



Frontiers of Market Efficiency

Market busts have never been isolated as economic turbulence per se. They always have a certain sociopolitical dimension.

Even the task of detecting the occurrence of an impending economic downturn and assigning statistical probability to it is not simple. The difficulties may lie in the sheer number of variables and data dimensions involved.

Fortunately, advances in quantum computing hold great promise for locating impending crisis signals using algorithms in assessing global and individual countries' economic situations.

Progress in quantum computing also heralds an era where optimal asset allocation at every continuous point in time will be possible in the near future. Exploration of such optimal portfolio investment in financial markets, for example, will come as a result of the availability of advanced computing techniques. Due to its complexity, the existing method of optimal portfolio theory is dependent on approximations enabling the calculation of optimal investment at a discrete point in time in the future. An algorithm to solve infinite time series-based horizons of portfolio holdings will work only in more advanced computing environments.

The obvious benefit stemming from this may be in the form of a "superefficient market" indicating the best possible allocations to the right agents in the market while leaving most probably zero chance for speculative action or irrational exuberance, which would induce downturns and upswings in the market.

"Economic boom and bust is, to a large extent, influenced by the degree of rationality of market agents at play. Crises may occur due to self-fulfilling prophecy of the market player perturbed by white noises in the market. Technology advancement holds great promise in attenuating human irrationality including maintaining economic cycle free from irrational exuberance. Technology may also facilitate better allocation of resources."

The Awakening of a New Sentient Being

When the renowned French sculptor Auguste Rodin unveiled The Thinker, he likely believed that only humans could produce intelligence and experience complicated emotions.

The widely held belief in humans' unique cognitive ability was challenged when the AlphaGo program beat the top-ranked human Go player in 2015.

The belief in that unique human ability has now been downgraded to an arguable proposition, implying that disruptive technologies can overcome "eternal" beliefs and truths.

Humans are in the gradual process of giving their judgment work away to artificial general intelligence (AGI). The legal sector has incorporated AGI technologies that slash the time spent on preparing for the trial process drastically, which is expected to reshape the legal market in 10 years. Currently, some courts in the USA are using the AI legal-tech program Compas to ascertain probable levels of guilt. Including the most popular legal technology system, ROSS Intelligence built on the IBM Watson's cognitive computing platform, there are an estimated 1,500–2,000 legal-tech companies in the USA. As well as legal circles, other knowledge-based professional areas that require reasoning and problem solving under uncertainty such as medicine are also proactively adapting to unmanned business operations.

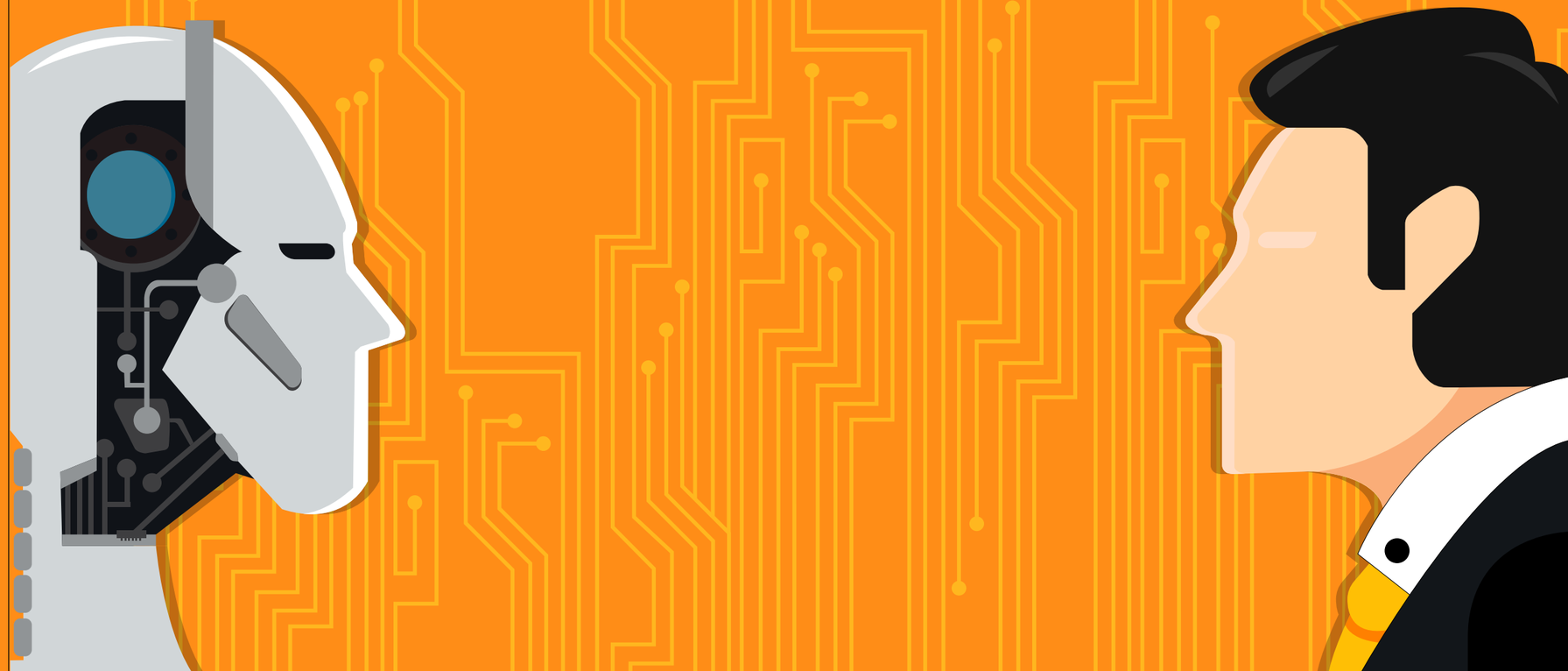
"Humanized judgment that was conventionally regarded as a sacred realm of human ability has been partially replaced by thinking machines. Programmed with artificial general intelligence (AGI), the machines mine the downward deepest learning and self-evolving without human intervention. The AI is no longer for specific intellectual tasks but underway to cover a full range of human cognitive ability as a new intellect."

People have an intrinsic aversion to machines trespassing in their own cognitive realms, especially when it comes to the arts and humanities.

That unspoken taboo has cracked slowly after the release of the AI-scripted experimental sci-fi short film, Sunspring. An AI bot created the screenplay using neural networks. The bot was initially called Jetson but later renamed itself Benjamin after learning movie scenarios like Star Wars and Ghostbusters. In the same year, IBM's Watson also showcased its first movie trailer, Morgan. Recently, AI bots have starred in movies. The movie Doomsday Book released in the ROK in 2011 introduced an AI bot working at a temple, which later became enlightened with the teachings of the Buddha and preached sermons to the monks in residence.

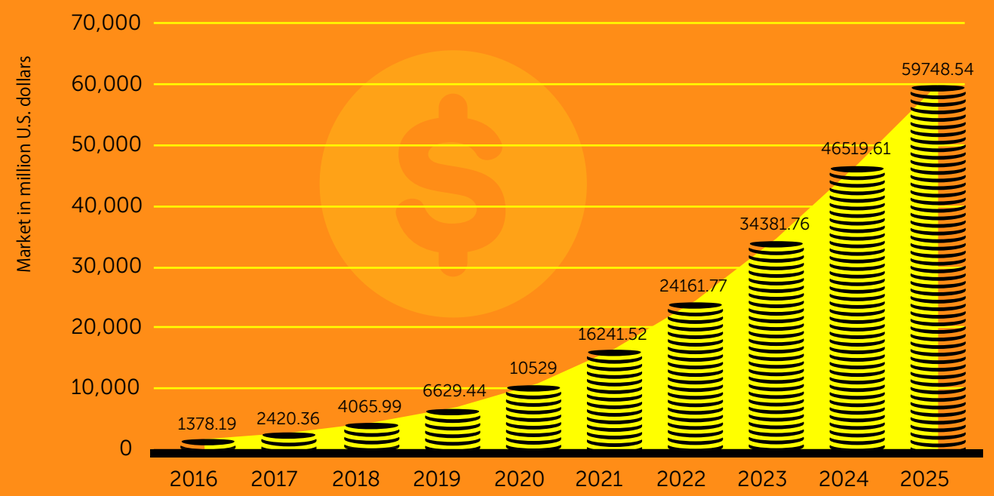
Since the term "AI" was first introduced at the Dartmouth Conference 1956, AI copied humans "artificially" but could not really evolve its thinking. However, the formation of an ultraconnected society and astronomical amounts of data are about to manifest humans' sci-fi imagination in AI.

Facing the unprecedented digital evolution, it is time to welcome and ready for uncomfortable coexistence between humans and artificial creatures.
creatures.



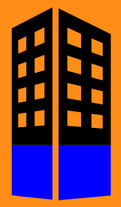
Revenue from the artificial intelligence (AI) market worldwide, from 2016 to 2025

By 2025, revenue earned from AI will increase by 43 times more than that in 2016. Areas which highly adopt AI technology are telecom, automotive, assembly, finance services and retail.



Source: statista, 2018 [https://www.statista.com/statistics/607716/worldwide-artificial-intelligence-market-revenues/]

30%



30% of enterprises are planning on expanding their AI investments over the next 36 months.

62%

62% expect to hire a Chief AI Officer in the future.

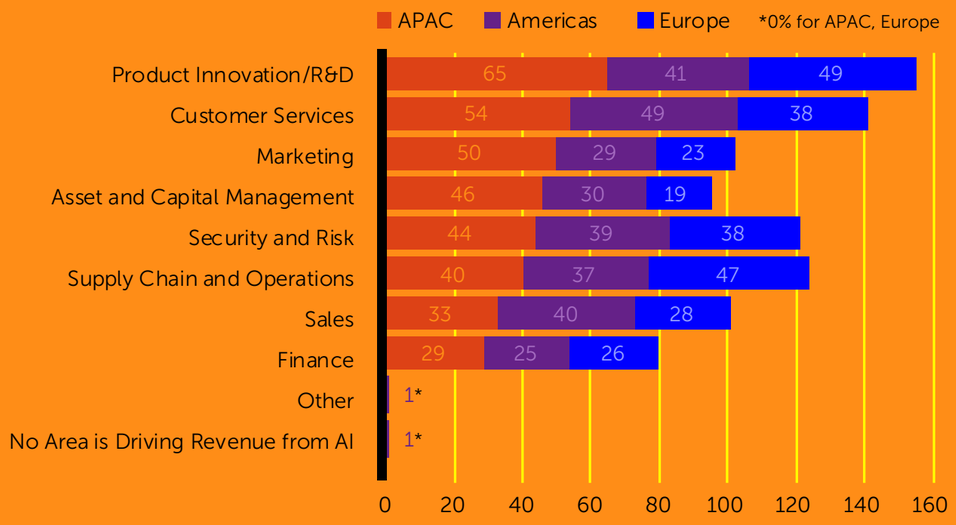
91%

91% see barriers ahead with lack of IT infrastructure (40%) and lack of talent (34%) as the most significant.

Source: Forbes, 2017 [https://www.forbes.com/sites/louiscolumbus/2017/10/16/80-of-enterprises-are-investing-in-ai-today/#664ee91b4d8e/]

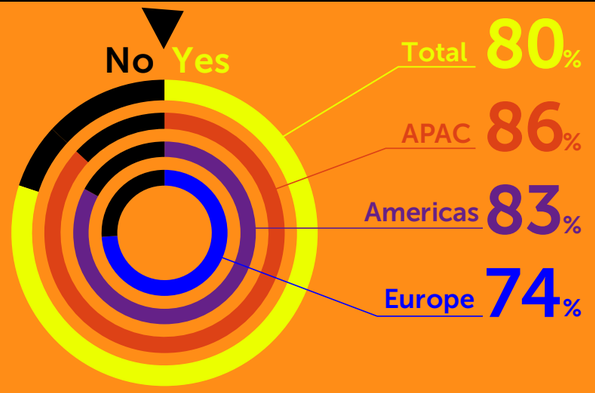
APAC is the global leader in driving AI revenue from most of the selected industry.

APAC occupies the most AI revenue from R/D, product innovation, customer service, marketing, and etc. Europe and Americas show their strongest share in supply chain & operations and sales each.



80 % of enterprises have active AI in production today, led by the Asia-Pacific region

Does your organization have any AI capabilities currently in production?



Yes for "we'd consider AI to be in significant use and deployed operational but there is lots of room for further implementation and process integration.

Avant-Garde Society

Self-reinforcement of natural intelligence and AI together with all the technological advances attached to the latter will happen after the "singularity point" can be reached.

In its narrowest sense, the singularity point refers to exponential, continuous regeneration of superhuman intelligence in similar beings. In its more advanced form and function of intelligence, it is usually termed an "intelligence explosion." Ceaseless disruption is the undeniably inherent state of being in such an environment.

Increasing functional intelligence will be related to tech-generated social transformation. Society will have new sets of norms, values, behaviors, etc. in the posttransformation period.

Whatever forms the new society will take after the singularity point has been reached, the prevailing technology will still be dependent on social, cultural, and political forces shaping the development of the technology. This offers the promise that the intelligence explosion will not deviate from serving the needs of the human beings who invented the technology in the first place. Technological awesomeness, for instance, may open the door to superefficient allocation of resources, leaving less room for socioeconomic inequality and poverty. Any activities within such a society can be directed to have the least environmental impact. Economic planning may be replaced with a fusion of human intelligence and AI to come up with policies to optimally address certain problems by inputting almost all necessary information relevant to the solution across different space and time boundaries.

"Intelligence explosion, a term used to describe the omnipresence of super intelligence, would make possible the creation of exact copies of human beings with enhanced capacity and characters serving the purpose of natural intelligence, i.e., human itself. This would also lead to the birth of the imitation of the realm in new dimensions of space and time where the super intelligence human inhabits. Such explosions in intelligence and enhanced virtual environments have potential to spark benefit to the endeavor of real human beings to find solutions to the problems existing in their 'real' world they are living in deriving from its 'artificial' realm."

Sine-Natio Sphere

Human beings are designed to think linearly. While we are capable of creating exponential technology to complement our "linear-thinking" deficiency, society, which is a collection of human beings with similar ideas, values, norms, etc., needs to prepare for "exponential transformation" as a consequence of introducing "exponential-thinking" digital technologies.

In a 2014 report, the US National Intelligence Council predicted scenarios of how the world would look a generation later.

In one scenario depicting the world in 2030, the report outlined a situation where governments stopped evolving and instead devolved into smaller enclaves, which then subcontracted many responsibilities to outside parties. Those outside parties then set up nongovernment enclaves regulated by their own laws. The enclaves are known as "para-states" operating under their own

"The speed of interconnectedness among entities including nation states, independent of its size, function and structure, would be ricocheting to its unparalleled exponential trajectory fueled up by inherent convergence property of digital technological advancements together with their newly created formation of 'virtual' time and space dimension in complementary to its 'natural' realm all of which bring about unprecedented transformation of society. While the alternative mode of governance such as a hybrid public-private or 'para-states' can be seen at present time, states would disappear and dilute into a single form of governance across traditional nation states leaving most of its governance structure would be located in a virtual world."

modes of governance formed based on certain functions which have the potential to diminish the role of governments or nation-states. This is the starting point of the disappearance/end of nation-states.

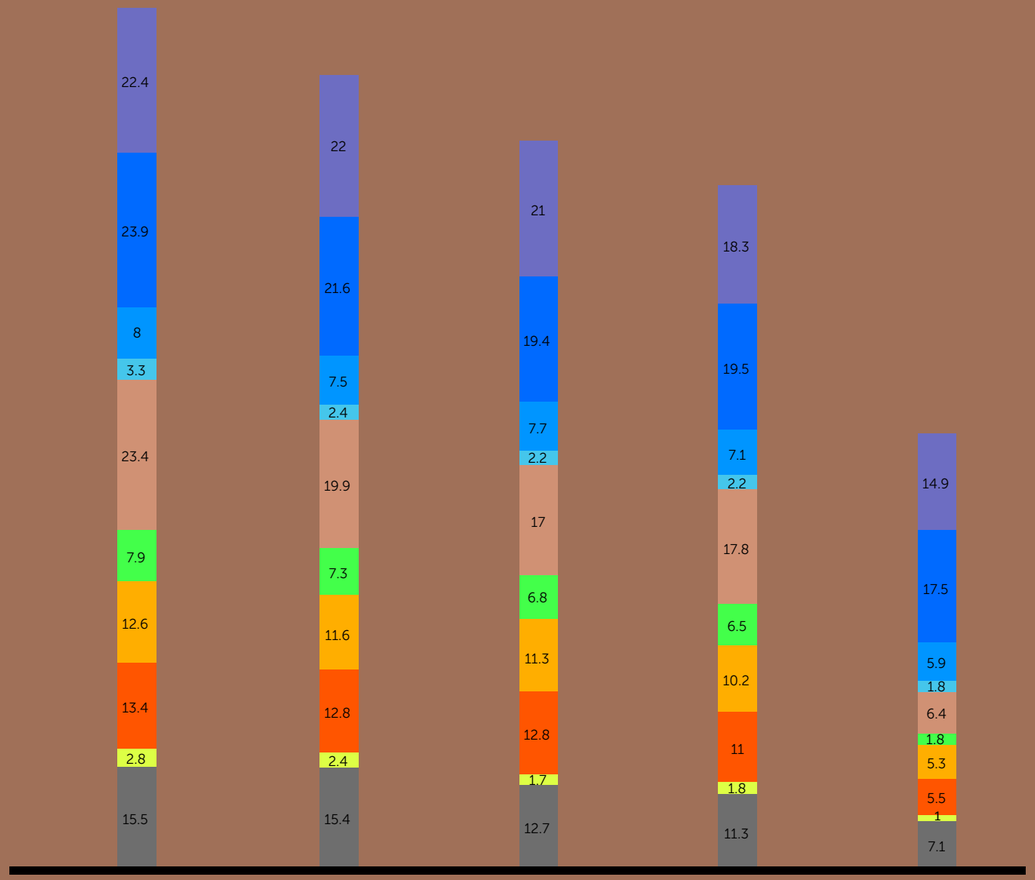
It is interesting to note that digital technologies are also run on platforms that can be regarded as enclaves or "virtual para-states" having their own modes of regulation, structure, and function.

While there is an increasing tendency for governments to digitize their services to uphold the principle of efficiency, it is acceptable to argue that governments would end by giving up most of their functions and structures to the "virtual para-states." The inherent converging nature of digital technologies opens possibilities for machines, the virtual and physical worlds, and humans to interact seamlessly with each other on a platform, which would contribute to the further diminishing of government entities as physical institutions. Almost all government functions and operations could be located in the virtual world, while public service delivery would still be in the physical domain.

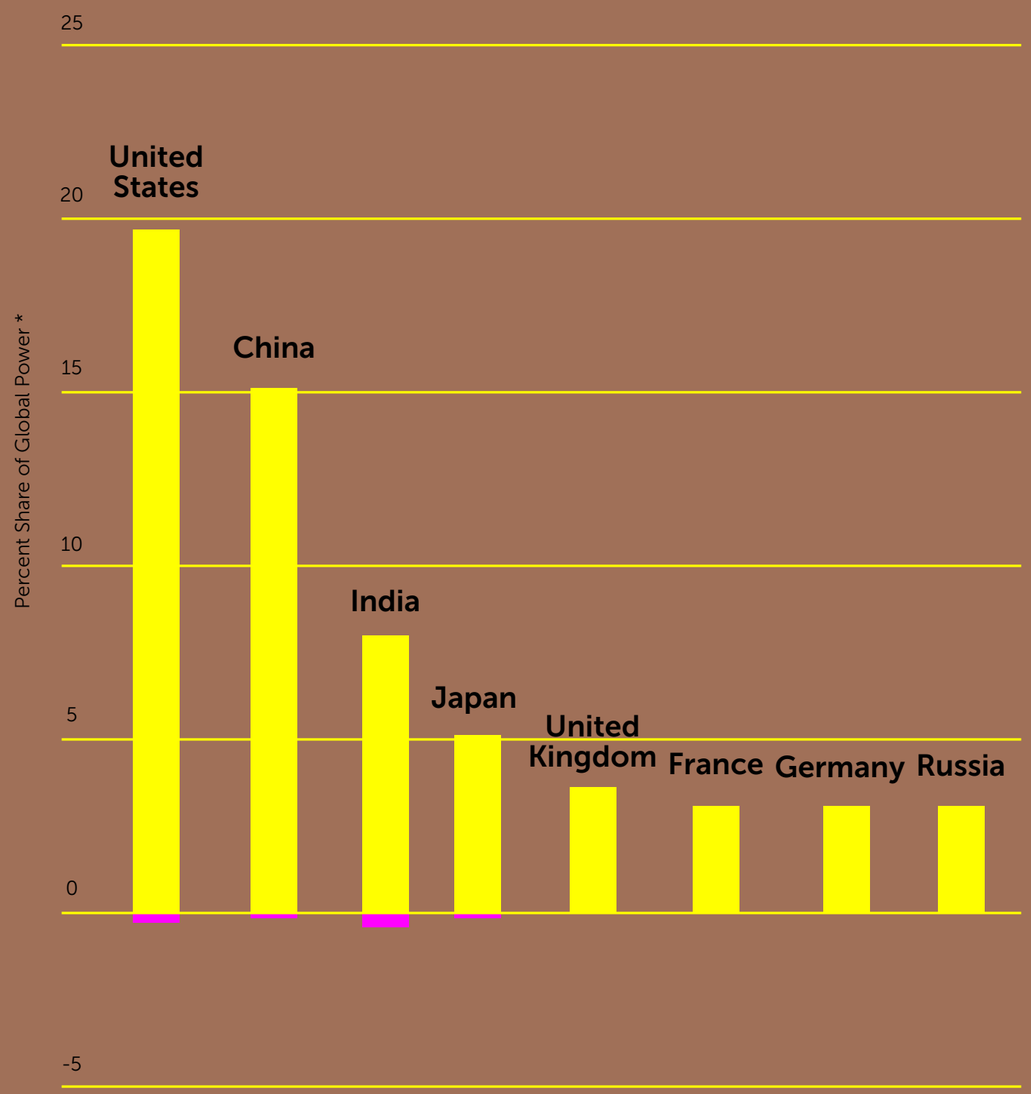
Taking into account the exponential nature of digital technological changes pushing more multidimensional interconnectedness of virtual "para- states," it is possible to expect that the world, in the somewhat near time horizon, will no longer recognize nation-states in the notion as we know it today.

Comparison of Global GDP Composition in our 2030 scenarios

The graphic below illustrates patterns in the shift in global economic clout across regions (measured in terms of their share of real global GDP) in 2010 and in our four scenarios for 2030.



Elements of Power of Leading Countries in 2030



*The percentage includes category of : Internet/Communication Technologies, Research & Development, Government Revenue, Human Capital, International Assistance, Foreign Direct Investments, Trade, Nuclear Weapons, GDP(Purchasing Power Parity), Military Spending, Energy

Source: National Intelligence Council. Global Trends 2030: Alternative Worlds. American Office of the Director of National Intelligence website, last accessed on 10 April 2018. [https://www.dni.gov/files/documents/GlobalTrends_2030.pdf]

References (in order of appearance)

Expectexceptional.economist.com. (2018). Improving disaster response efforts through data. Available at: https://expectexceptional.economist.com/improving-disaster-response-efforts -through-data.html [Accessed 4 Apr. 2018].

Siegler MG. Eric Schmidt: Every 2 days we create as much information as we did up to 2003. TechCrunch, August 2010.

Big data and business analytics revenues forecast to reach $150.8 billion this year, led by banking and manufacturing investments. Worldwide Semiannual Big Data and Analytics Spending Guide, IDC, March 2017.

Sim W. Rise of the supercomputers: Japan going big on quantum computing research. The Straits Times, 28 January 2018. Available at: http://www.straitstimes.com/asia/east-asia/going-big-on-quantum-computing-research [Accessed 4 April 2018].

Barrett, B., Staff, W., Colt, J., Matsakis, L., Camp, J. and Nystedt, B. China's New Supercomputer Puts the U.S. Even Farther Behind—Like, Way Behind. [online] WIRED. Available at: https://www.wired.com/2016/06/fastest-supercomputer-sunway-taihulight/ [Accessed 9 Apr. 2018].

Nakajima H, et al. Social intelligence in a human–machine collaboration system. Trans Jpn Soc Artific Intell, 2004; 19: 184–196.

Knight W. How human–robot teamwork will upend manufacturing. MIT Tech Rev, 16 September 2014.

US National Research Council. Intelligent Human-Machine Collaboration: Summary of a Workshop. Washington, DC: National Academies; 2012.

Www2.dimensiondata.com. (2018). [online] Available at: https://www2.dimensiondata.com/-/media/dd/corporate/digital-social-word/the-exponential-digital-social-world-white-paper.pdf [Accessed 11 Apr. 2018].

Bishop S, Perry N, Marrocchelli D, Sheldon B (eds).Electro-Chemo-Mechanics of Solids. Cham, Switzerland: Springer International Publishing; 2017.

Dorrier J. Quantum computers will analyze every financial model at once. Singularity Hub, 16 September 2018. Available at: https://singularityhub.com/2017/06/08/quantum-computers-will-analyze-every-financial-model-at-once/#sm.00001hjebb88x6dx3zncyb40rqr54 [Accessed 4 April 2018].

Borowiec S. AlphaGo seals 4-1 victory over Go grandmaster Lee Sedol. The Guardian, 15 March 2016. Available at: https://www.theguardian.com/technology/2016/mar/15/googles-alphago -seals-4-1-victory-over-grandmaster-lee-sedol [Accessed 4 Apr. 2018].

Sills A. ROSS and Watson tackle the law—Watson. Available at: https://www.ibm.com/blogs/watson/2016/01/ross-and-watson-tackle-the-law/ [Accessed 4 April 2018].

Etnews. (2018). Interview with the representative of Intellicon, a leading company in legal tech in ROK, Etnews. Available at: http://www.etnews.com/20180315000125?mc=em_106_00002 (Accessed 15 March 2018).

Slideshare.net. (2018). JWT: The Future 100 - Trends and changes. [online] Available at: https://www.slideshare.net/FilippPaster/jwt-the-future-100-trends-and-changes [Accessed 9 Apr. 2018].

YouTube. (2018). Morgan | IBM Creates First Movie Trailer by AI [HD] | 20th Century FOX. [online] Available at: https://www.youtube.com/watch?v=gJEzuYynaiw [Accessed 9 Apr. 2018].

Fischer, R. (2018). 'Doomsday Book' Review: Thankfully, It's Not the End of the World [Fantastic Fest 2012] – /Film. [online] /Film. Available at: http://www.slashfilm.com/doomsday-book-review-thankfully-its-not-the-end-of-the-world-fantastic-fest-2012/ [Accessed 9 Apr. 2018].

Moor J, The Dartmouth College Artificial Intelligence Conference: The next fifty years. AI Magazine, 2006; 27: 87–91. Available at: https://pdfs.semanticscholar.org/d486 /9863b5da0fa4ff 5707fa972c6e1dc92474f6.pdf (Accessed 15 March 2018).

Forbes.com. (2018). Forbes Welcome. [online] Available at: https://www.forbes.com/sites/louiscolumbus/2017/10/16/80-of-enterprises-are-investing-in-ai-today/#664ee91b4d8e [Accessed 11 Apr. 2018].

Globaltrends2030.files.wordpress.com. (2018). [online] Available at: https://globaltrends2030.files.wordpress.com/2012/11/global-trends-2030-november2012.pdf [Accessed 11 Apr. 2018].

Publicintelligence.net. (2018). National Intelligence Council Global Trends 2030: Alternative Worlds | Public Intelligence. [online] Available at: https://publicintelligence.net/global-trends-2030/ [Accessed 9 Apr. 2018].

Khanna P. (2013). Opinion | The End of the Nation-State? nytimes.com. Available at: https://www.nytimes.com/2013/10/15/opinion/the-end-of-the-nation-state.html?pagewanted=all [Accessed 4 April 2018].

SHAPING THE IMPOSSIBLE

SUSTAINABLE PRODUCTIVITY SUMMIT

2018 **10. July** TUES

BY INVITATION ONLY

TOKYO, JAPAN

2018

Organized by

APO

Supported by

Japan Productivity Center
Japan International Cooperation Agency
Japan External Trade Organization
The Japan Foundation
Japan Association of Corporate Executives
Japan Business Federation
Japan Chamber of Commerce and Industry
The Association for Overseas Technical Cooperation and Sustainable Partnerships
World Bank Group
Centre on Integrated Rural Development for Asia and the Pacific
Pan African Productivity Association
Centro de Cienciay Tecnología deAntioquia

The Summit

Technological changes and disruptions are occurring daily in every sphere. Old industries shrink or disappear, while new ones alter the social, economic, environmental, and political landscape. Today, technologies are combining new ways of improving business performance and productivity, offering benefits as well as challenges to which the public and private sectors must respond. Business leaders must update organizational strategies in the face of continual evolution, ensure that their organizations always look ahead, and use technologies to improve performance. They must also plan for a range of scenarios, abandon assumptions about where competition and risk could arise, and look beyond long-established models.

All organizations should be able to act fast, make informed decisions now, and fine-tune strategies or policies as necessary. It is therefore critical for leaders to understand which technologies will alter their circumstances and prepare accordingly. The APO Sustainable Productivity Summit will orient member countries on "the next big thing" and technologies shaping the future of productivity while creating maximum benefits for their economies.

Venue Imperial Hotel, Tokyo

Contact Phone: 03-3830-0411 Email: aposummit2018@apo-tokyo.org

The Futures Team

Ta-Te Yang
Mayu Chiba
Huong Thu Ngo
Dr. Jose Elvinia
Towfiqul Islam
Arsyoni Buana
An Funakoshi
Joshua Lau
Shoko Ikezaki
Jisoo Yun

(Left to right order)

Design Concept: Etsuko Okabe

SUSTAINABLE PRODUCTIVITY

THE NEW FRONTIER FOR PRODUCTIVITY

ASIAN PRODUCTIVITY ORGANIZATION