

APR 2018

# THink

The HEAD Foundation Digest

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A hand is shown holding a CD. The CD's surface is a dark, reflective blue. In the center of the CD, there is a circular image of a futuristic, multi-tiered architectural structure with greenery and a person walking on it. The background is a dark blue space with a glowing blue planet and white, star-like light trails.

**Visions for the Future**

## EDITOR'S MESSAGE

Amidst all the discussions and debates on AI, robotic workforce, big data and autonomous vehicles, we invited the contributors of the third issue of THink to share their *visions for the future* with our readers.

After following the development of Internet for 23 years, **Max Hitchens** believes the key word for being a futurist is "Dream", and that we should take time off to ponder how we can seize the many "Internet opportunities" around us and to prepare for the future.

In the matter of preparing for the future, nothing can be more important than education. **Ronald Ng** predicts that MOOCs (Massive Open Online Courses) will play an increasingly important role in education for all ages, and MOOCs will effectively equip us with most, if not all, of the skills and knowledge we need to survive the future. On the other hand, the role of libraries, a traditional source of knowledge, is being disrupted in a world where unlimited information and knowledge is virtually at our fingertips. Two veteran librarians, **Amarjeet Kaur Gill** and **Valerie Siew** suggest ways in which public libraries should proactively reshape and repurpose themselves for the future. Focusing on the education needs of a specific country, **Stuart Patience** proposes to introduce "open-source curricula" on the Internet to bridge the educational divide in Indonesia.

While education prepares us for the future, our workplaces make use of our skills and knowledge to help shape and materialise the future. **Irene Wu** argues that the best way to equip the future workforce with the "21<sup>st</sup> century skills"— collaboration, communication, creativity and critical thinking — is by teaching *design thinking*. In her article, she shares her experience in conducting design-thinking workshops for young community leaders in Asia. Similarly, as an entrepreneur who advocates the concept of *universal design* (UD),

**Santi Srivicharnkul** believes that an inclusive society of the future can benefit much from a design mindset that "has everyone in mind". While on the topic of design, **Lawrence Lek** offers us a glimpse of how art might look like in the AI age through a science-fiction world he designed for his film.

The presence of the world's largest workforces — in China, India and ASEAN — coupled with the advent of Industry 4.0, means that the HR function must reinvent itself in Asia, argue **Bob Aubrey** and **Sriven Naidu**. Lifelong learning, self-management and "soft power" are among the key elements in such a HR system of the future, they envisage. However, most organisations will take some time to transition into the future HR mode. Meanwhile, a *cellular organisation structure* proposed by **John KC Tan** may help to cultivate a harmonious work culture that allows organisations to innovate their ways into the future.

A sustainable environment with clean energy sources is what most people wish to see when they envision the future. **Chan Sue Meng** explains why helping to sustain the environment makes good commercial sense, while **Qi Li** updates us on how state-of-the-art scientific and engineering research will help us create more livable urban centres in the near future. A suggestion on how energy problems can be solved in a city-state like Singapore is also made by **Lim Soon Heng** and **Professor Jacopo Buongiorno**.

Lastly, we wish to take this opportunity to invite our readers to contribute articles to future issues of THink. If you have leading thoughts or innovative ideas on topics related to education or human capital development, we wish to hear from you!

Enjoy!

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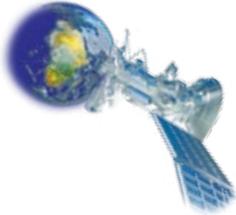
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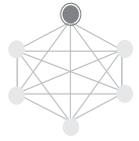


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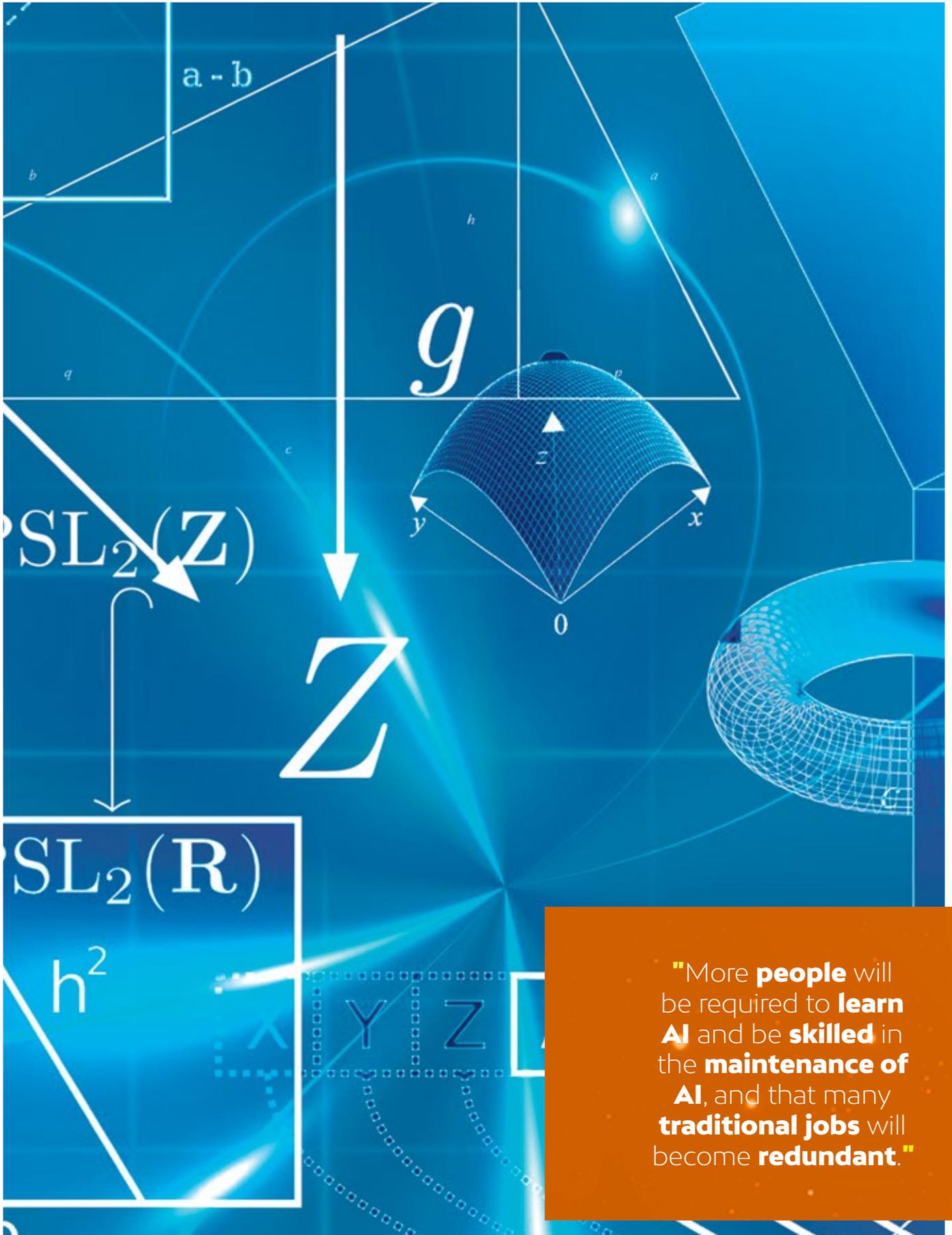


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"More **people** will be required to **learn AI** and be **skilled** in the **maintenance of AI**, and that many **traditional jobs** will become **redundant.**"

# Learning for the Future

DR RONALD NG

A few months ago, an English friend of mine who is a retired senior banker living in Johor Bahru, came to me for help. His passport was due to expire and he urgently needed to renew it. He used to be able to renew his passport at the British High Commission in Singapore, but the system has now been changed completely. The only way to renew his passport was by way of the Internet, and he had absolutely no idea what to do. After I had filled up the form for him online, and had even taken a digital picture of him to go with it, I told him the incident reminded me of the old times in Singapore-Malaya, when an illiterate migrant Chinese worker would go to a "scribe" sitting on a little stool and a table and pay the scribe a fee to write a letter back to his village.

I think most of us now know the importance of being computer literate so I won't labour that point. But is it enough for the next generation of children to be taught the 3Rs of Reading, wRiting and aRithmatics, and the use of computers? What will the future learning environment and future learning requirements be like?

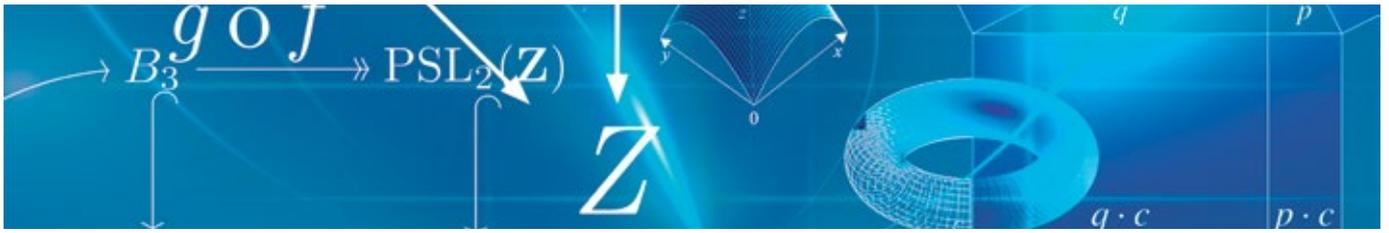
Using computers and the Internet for distance learning started in 2006. Prior to that, distance learning in the form of correspondence courses and use of radio or television was tried—but never took off in a big way. Then in 2012, with the launch of Coursera by two professors at Stanford University, and Udacity by another Stanford professor, followed quickly by edX, which was started by MIT, MOOCs (Massive Open Online Courses) hit the news in a big way. There were talks of MOOCs being a disruptive technology to the traditional learning environment of classrooms and teachers. Professors Andrew Ng and Daphne Kohler, co-founders of Coursera, were even named jointly by *Time* magazine as one of the top hundred most influential people in the world that year. Many universities joined in producing MOOCs, either using those well-formed platforms or starting their own.

However, it was soon noticed that only 5 to 10 per cent of students who signed up for those courses managed to complete them, and questions were raised regarding the hype. As with all new technologies, there would be a slow take-off phase, followed by more rapid take-off and hype with inflated expectations. That was the situation in 2012. Inevitably, that would be followed by a deflation of the hype, to be followed by a more realistic reassessment of the technologies and their contribution to society. I think we are now at that phase.

How are MOOCs different from the old-style distance learning? As the lectures are online, one can access the lectures, and even download them and watch them anytime at one's own convenience. There are also extensive discussion forums associated with the courses, where one can interact with other students and the teaching staff. The forums are monitored by Teaching Assistants (TA) and one can pose a question, which could be answered by another more knowledgeable student or by a TA within minutes, if not hours. In the middle of the lectures, the lecturer might pose a question in the form of a multiple-choice question, which one has to answer before one can proceed. This is to ensure one has understood what has been said. Either within the course or at the end of the course, there would be "exam(s)" which one has to pass in order to get a certificate. To me, this is the weakest link in the system. Since the exams are not proctored, and though there is an honour code, which forbids help from other people when taking the exams, one is never sure about who has taken the exam. In other words, cheating could occur.

I will now speculate on what the future-learning requirements will be and then come back to show how MOOCs can dovetail neatly to those requirements. I will also proceed on the assumption that the predictions about the impact of Artificial Intelligence (AI) on the job market will mostly be correct; that is, more people will be required to learn AI and be skilled in the maintenance of AI, and that many traditional jobs will become redundant.

For the retirees and those about to retire, MOOCs are a wonderful source from which they can learn subjects of interest to them when they were young (but were unable to do so because they didn't have the time). When I was young, I was interested in philosophy and astronomy but was unable to pursue those disciplines as I was going to be a medical doctor. Now, I have taken eight courses on astronomy and an equal number of courses on philosophy. I was also interested in computers and AI, and now I have done courses in programming as well as a course on Machine Learning by Professor Andrew Ng. The retiree could also learn something from MOOCs to help their grandchildren. There is now much evidence that show that children will benefit from being taught computer programming from young. MIT has developed a Lego-like virtual language called Scratch, for children to play and learn about programming. They have even developed an app called ScratchJr, which runs on tablets, and children as young as six can play with that. A retiree can learn how to do Scratch on edX,



and this most certainly will equip the grandparent to help the grandchild. It also adds to bonding between the two. Incidentally, there are even courses that teaches one how to write music!

For those in the workforce now, MOOCs are a good way to upgrade one's skill as well as to learn new skills. I will give one example of the latter. In my work as a medical doctor, I once met a medical graduate of a medical school in Myanmar. She could not get a license to practise in Singapore and so worked as a drug salesperson. In our conversation, I learnt that she was interested in clinical research so I encouraged her to do the course on Coursera on Clinical Research. A year later, I met her again. After having done that course, her company transferred her to the clinical research section! Most of the drug sales people are either pharmacy-trained or finance-trained. I always encourage the finance-trained to learn pharmacology from MOOCs and those pharmacy-trained to learn about finance. So, MOOCs can fill in the gaps in knowledge that is required in our working life.

A recent article in Forbes<sup>1</sup> describes how Coursera is now working closely with the corporate world to develop courses for the teaching of new skills, especially AI, and the upgrading of skills required in the corporate world. According to that article, Coursera in 2017 had 500 corporate customers, up from 30 in 2016.

For many countries in the third world, providing tertiary education is an expansive undertaking. Take for instance Cambodia. During the Pol Pot era, virtually a whole generation of intellectuals was massacred, and now medical schools face a problem of recruiting teachers. I am on an advisory committee in one of the medical schools, on how to upgrade the school. An obvious answer is to use MOOCs for some of the lecture subjects that do not require hands-on experience, such as physiology and pharmacy—and they have taken up that suggestion. I understand that more than a few universities in India and Africa have also taken that approach. MOOCs are a boon to upgrading skills in the third world.

Regarding the potential loss of jobs due to AI, what can be done? Of course one can learn AI skills from MOOCs, but what about those who cannot? There are now talks of society providing Universal Basic Income (UBI) to solve the financial problem created by massive loss of jobs. But then, what does one do if one is jobless? It is not just

a question of survival, but what does one do with the spare time? Sports? Partying? Going out with friends? MOOCs permit another avenue for one to spend one's time—learning new things.

Even though there is much talk that the world is moving into the information age, we still need cooks and chefs, carpenters, plumbers, electricians, cleaners etc. Not every person is suited for academic studies, book learning or MOOCs studying. Even with AI and robotics doing most of the work, we still need people in the service industries, and people who are good with their hands. Perhaps while extending the use of information technology, there is a need to expand training in skills that require human empathy and the use of one's hands as well.

So what does the new learning environment look like? For the very young, to learn the basic 3Rs, plus computer usage. For older children and college youths, the classroom will still be in place, but that will probably be supplemented by the use of MOOCs. For the working adult population, MOOCs will play a more and more important part in the upgrading of skills and the learning of new skills, and, contrary to current wisdom, perhaps expansion of apprentice programmes for the training of some, who are not suited for knowledge-based work, in the art and skill of craftsmanship, that of using one's hands to do fine work. ■

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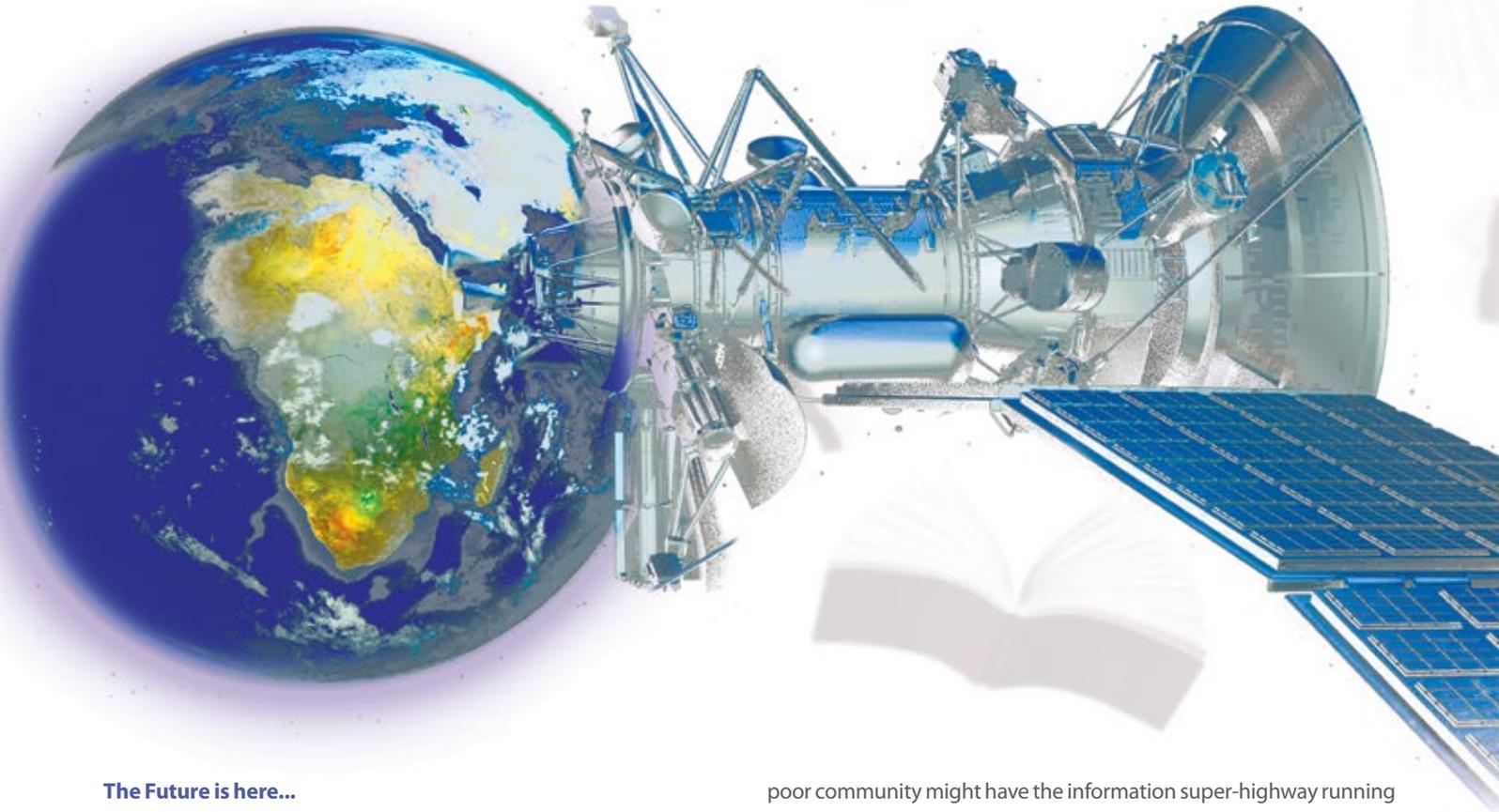
*Dr Ronald Ng is a clinical haematologist who at one time was Senior Lecturer at Hong Kong University and the then University College Hospital Medical School, London University. He was also a member of the Singapore National Medical Research Council when that council was first set up some 20 years ago. He has done over 125 MOOCs from Coursera, plus many from edX and lately four from Santa Fe Institute's Complexity Explorer. He is also a Principal Mediator at the Singapore Mediation Centre.*

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<sup>1</sup> Konrad, A. (2017, December 20). Coursera Fights to Keep the Promise of MOOCs Alive With Corporate Customer Push. *Forbes*. Retrieved from: <https://www.forbes.com/sites/alexkonrad/2017/12/20/coursera-goes-corporate-to-keep-alive-promise-of-moocs>

# Reading the Present, Writing the Future

STUART PATIENCE



## The Future is here...

The education revolution is upon us, and like all tomorrow's taxis, it's driven by digital technology.

It's in our schools, our communities, and our homes; it's on the screens and in the ears of autodidacts everywhere. Forget AI for a moment and understand the Internet in the simplest terms, as a giant copying machine. We live a click, a swipe, a mere word ("Hey Siri, Alexa, Cortana. Okay Google.") away from tuition from the world's best universities; from the most comprehensive encyclopaedia in history; from a vast array of interactive courses and open-source textbooks; from YouTube videos and Instructables on everything under the sun. And most of it is *free*. Granted, there's a lot of junk out there, but we're living in a golden age: it's never been easier or cheaper to access resources for learning.

## ...It's just unevenly distributed.

Learning has never been easier — as long as you can read. Access to the web's quality educational opportunities depends on your having already had a quality education. In our wireless world, children in a

poor community might have the information super-highway running through the air around them, but without an on-ramp of basic skills they're stuck living in its shadow. As data becomes ubiquitous and essentially free, education's digital divide is becoming less about bandwidth and more about the ability of individuals and societies to use what's already there. The irony is that access to 21st century learning opportunities depends on mastery of a 5000 year-old technology: the written word. Literacy, in the deep sense of being able to read with fluency and with critical understanding, and to write both to communicate and to think, is the bridge over the digital divide.<sup>1</sup>

Literacy is the foundation of quality education provision, and its contribution (along with numeracy and scientific understanding) to social outcomes and economic growth makes improving the quality of literacy teaching a natural focus for education policy worldwide.<sup>2</sup> In countries like Indonesia, where the reading performance of school-children and adults alike is extremely poor, it is an urgent priority.<sup>3</sup>

## Diverse Challenges

The hurdles that must be overcome to improve literacy outcomes worldwide are almost as diverse as the world's classrooms. Now that

**"Open standards for education and open-source curricula and resources could enable more rapid dissemination and localisation of good teaching practice and resources, and seed an "ecosystem" of supporting products and services that generate further improvements."**

most of the world's children are in school, the challenge lies in improving the quality of the teaching they receive, and the quality of resources available for learning. The case of Indonesia reveals how difficult this can be: it has some 3.7 million teachers teaching over 62 million children in a highly decentralised and geographically dispersed education system.<sup>4</sup> The need to improve literacy outcomes increases with distance from centres like Jakarta, as does the cost of intervention in terms of time and money, and the scarcity of expertise. With its enormous state sector, primary teachers in government schools might seem like a good place to start, but many Indonesian children are expected to arrive at school at age 7 already able to read and write, in practice if not in policy.

An alternative target is improving the quality of pre-primary education. Indonesia has almost half a million pre-primary teachers working in some 163,000 preschools across the country, but some 97 per cent of these are privately run by small teams with small budgets, making them hard — and prohibitively expensive — to reach with training and resources.<sup>5</sup> To make things harder, more than half of Indonesian children aged five to six (roughly 3.8 million kids) don't attend preschool at all. Those who learn to read in time for school are taught by a "long tail" of family members, neighbourhood tutors, charity workers and community volunteers — another order of magnitude harder to reach.

It's clear from this diverse set of constituents that there can be no one-size-fits-all solution for improving the quality of literacy teaching in Indonesia, even before considering adapting curricula to local contexts, or the sensitive issue of mother-tongue literacy. Many groups are doing good work, from the Ministry of Education and Culture and international NGOs down to individual schools, local charities, and community groups, but there is a mountain to climb, and progress is too slow.<sup>6</sup>

### The Education Super-Highway

But what if the Internet itself offered a model for how to accelerate improvements for all the groups described above, in the form of open standards and open-source software? Together, these have played a key role in the rapid expansion of the web by allowing people around the world to create, use and adapt the software that underpins it for use on a huge range of devices.<sup>7</sup> The potential of the same principles to accelerate improvements in education is already well recognised. Open standards for education and open-source curricula and resources could enable more rapid dissemination and localisation of good teaching practice and resources, and seed an "ecosystem" of supporting products and services that generate further improvements.<sup>8</sup>

### Open Standards for Literacy

In this context, a standard is a specification intended to ensure that a product or process is fit for purpose and works as expected. The open standards that underpin the web include those that allow computers to communicate, and standards for how digital information is structured so that, for example, documents, photos and music can be opened on a range of devices. If you're reading this in a web browser or document viewer, you've just benefitted from multiple open standards. These standards are "open" in the sense that nobody owns them or controls how they are used. They evolve in response to changing needs, and die out if they cease to be useful.<sup>9</sup>

An open standard for literacy education might start by offering a definition of literacy before describing a set of outcomes, skills and sub-skills that together constitute literacy in a given language. An open *pedagogical* standard could lay out principles of good teaching practice or methods for curriculum design. These standards might map neatly onto those created by national bodies, or extend, simplify, or localise them. Together they provide teachers, trainers and curriculum developers working in diverse contexts with a common vo-

cabulary, helping them to clarify goals and to establish shared reference points for evaluating and improving the quality of teaching and learning. Free to use and easy to adapt, they are tools for making the tools of education.

### Open-Source Curriculum Development

Open-source software is software that can be shared freely, and where the source code used to make it is available to all. Anyone can see how it works, improve and adapt it, or use it as the basis of something entirely new. Perhaps the best example of this is Linux, the free operating system that runs more than half of the Internet's servers (including those of Google, Facebook and Wikipedia) and the *billions* of phones and tablets running Android, a version of Linux. Apart from being free, the strength of open-source software is that it gets customised and extended by its users in response to their own needs. It often starts a bit rough and ready, but rapidly improves as people use and modify it, and share what's worked for them, creating astonishing value in the process.

An open-source literacy curriculum would work in a similar way. A busy teacher, or a teacher who has limited training or experience, might pick it up and use the whole thing in their classroom, saving time and effort and, assuming that the curriculum is of good quality, perhaps improving their teaching in the process. Some teachers might modify and improve it, sharing their changes for others to try, and the most useful pieces of this new "code" would be adopted back into the main curriculum. In another example, a charity might use the open-source curriculum as a basis for a mother-tongue literacy initiative, rewriting much of it but taking advantage of the existing standards and structure to achieve their own goals. Work based directly on this curriculum "kernel" would continue under an open-source license, but other supporting material such as training events, videos, books and other resources might be commercial.<sup>10</sup> The more the resources are used, modified and shared, the better their quality becomes, and the greater the value of the "ecosystem" in terms of its potential to support anyone teaching *anyone* to read, whether in school or out.

### Writing the Future

These are not new ideas, but the rapid expansion of Internet access and current levels of commitment to literacy education might make them ideas whose time has come for Southeast Asia. Open standards for education combined with open-source curricula and resources have the potential to multiply the effectiveness of work already being done by the diverse coalition of teachers and tutors, community

workers and parents working to bridge the educational divide. They may help us to reach a future where all our children have the skills to access the educational riches that the Internet offers — and to write our future. ■

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*Stuart Patience* is a founding board member of Yayasan Tunas Aksara, an Indonesian literacy charity. Find out more at [www.sayasukamembaca.org](http://www.sayasukamembaca.org)

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1 PISA 2018 Reading Literacy Framework Framework, pp. 6–10. Retrieved from: <https://www.oecd.org/pisa/data/PISA-2018-draft-frameworks.pdf>

2 Eric Hanushek has written extensively on economic returns to education. See Eric A. Hanushek and Ludger Woessmann, *The High Cost of Low Educational Performance: The Long-Run Economic Impact of Improving PISA Outcomes* (OECD Publishing, 2010).

3 See this blog post by Lant Pritchett: <https://www.riseprogramme.org/node/145>

4 Derived from UNESCO statistics retrieved from: <http://data.uis.unesco.org/> (2015 data).

5 "Private" schools include those operated by non-profit and community groups. These figures are from Amina Denboba, Amer Hasan and Quentin Wodon, *Early Childhood Education and Development in Indonesia: An Assessment of Policies Using SABER* (World Bank Publications, 2015).

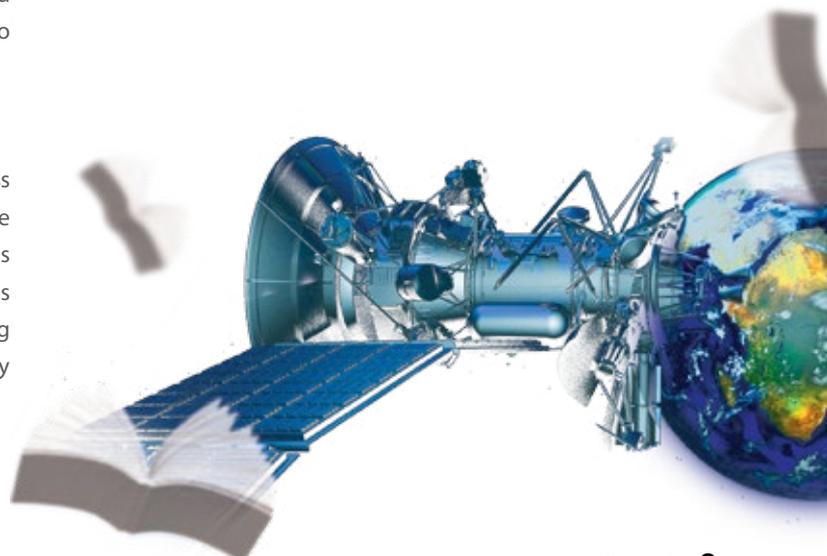
6 At current rates of progress, it will take more than 100 years for the average Jakartan student to reach the current OECD average. For more details, see *Research on Improving Systems of Education*, retrieved from: <https://www.riseprogramme.org/node/145>.

7 For a good overview of the mix of government, commercial and scientific innovation that made the internet possible see Walter Isaacson's *The Innovators: How a Group of Inventors, Hackers, Geniuses and Geeks Created the Digital Revolution*. Simon and Schuster, 2014.

8 See Open Educational Resources, <https://www.oercommons.org/> and [OpenSource.com](https://opensource.com/tags/education), <https://opensource.com/tags/education>.

9 For more information, see <https://open-stand.org/about-us/principles/> or <https://opensource.com/resources/what-are-open-standards>

10 For an introduction to business models based around open source projects, see [https://en.wikipedia.org/wiki/Business\\_models\\_for\\_open-source\\_software](https://en.wikipedia.org/wiki/Business_models_for_open-source_software)



# Developing 21<sup>st</sup> Century Skills in Asia Through Design Thinking

IRENE WU



"...in order to **successfully design** a **solution** that effectively **solves a problem**, the designer must **put ideas into action**, so **"failing" early and often** is an **essential part** of the **process**."

## Development in Asia: Promises and Peril

Asia, a continent rich in history and heritage, has been on a steady path of growth after centuries of colonialism and decades of civil and regional wars. Based on Asia's rapid development over the past three decades, Lee and Hong predicted a 16 percentage-point increase in the region's share of the global economy by 2030.<sup>1</sup> The Asian Development Bank expressed an optimistic 7.2 per cent economic growth for South Asia in 2018,<sup>2</sup> and a recent publication from the World Bank predicted another year of positive growth for East Asia and the Pacific for 2018.<sup>3</sup>

Despite the impressive pace of growth, much is still wanting if this conglomerate of diverse nations is to achieve sustainable development in today's increasingly disruptive global economic climate. Take education as an example: many education systems in Asia still rely heavily on rote memorisation and place high value on academic exams which are viewed as indicators of students' "success", while many OECD countries have shifted to project-based learning.<sup>4</sup>

Lastly, academic plagiarism is still an all-too-common problem in Asia, even among university students.<sup>5</sup> Because education is the lynchpin of societal progress, the traditional education approach prevalent in Asia will soon become obsolete, if it has not already. To ensure continued fast growth, this generation of young Asians — our future workforce — are in dire need of skills training in collaboration, communication, creativity, and critical thinking — commonly called 21st century skills.

## Developing 21st Century Skills Through Design Thinking

In 2017, I had the opportunity to deliver youth leadership programmes in collaboration with local NGOs in under-resourced communities in China, Thailand, Cambodia, Indonesia, and Myanmar through the JUMP! Foundation. Youth undergo an intense week where they learn to design community improvement projects, and in the process think critically about social issues, creatively come up with solutions, and hone their skills in communicating with various stakeholders and collaborating effectively with team members. We have received consistently positive feedback so far and have seen projects designed by youth being successfully implemented in their communities as a direct result of this programme.

A major component of this programme is training youth to apply design thinking — a practice common among high-performing companies such as Apple and IDEO — in solving their community issues. Design thinking fundamentally differs from traditional problem-solving in a few ways. First, design thinking is intensely human-centred, with empathy being the foundation of design. Rather than analysing the problem solely through research and theoretical speculations, designers also talk to a variety of stakeholders as a way to

uncover hidden insights and root causes of an issue. Second, design thinking is biased towards action; rather than trying to come up with a "perfect" product, designers like to create prototypes early on and test them with the users in order to continuously improve their product.

Even though our particular programme is delivered outside of schools, it is entirely possible to apply design thinking in formal education settings. Because design thinking is a mindset and a method, it is widely applicable; students can work on cross-disciplinary in-school projects that combine English, social studies, art, business, and mathematics. For teachers and administrators, they can utilise design thinking in restructuring curriculum and students' overall school experience. The section below breaks down the process into its components, with a few suggestions for guiding students through the approach.

### Empathy

As the foundation for design thinking, empathy requires the designers to see beyond one's own perspective and examine an issue from others' points of view. At this stage, students immerse themselves in understanding a particular problem. After doing some preliminary reading on existing literature and research, students can identify the various stakeholders and experts related to the issue and conduct interviews in-person or via email and phone. This step requires great communication skills in order for students to develop a wealth of knowledge and insight on the issue, which serve as the groundwork for their project.

### Problem Re-Definition

As students learn to empathise with the experiences of various stakeholders, they begin to be able to redefine the initial problem in terms of people's needs that are yet to be fulfilled. The new problem statement often starts with "How might we..." in order to clearly identify a stakeholder group for whom students will focus their efforts, and an actionable goal to be achieved. This stage demands that students think critically beyond the surface of the problem, and examine deeper needs that will ultimately improve the situation in a more effective and sustainable way.

### Ideation

This stage is all about creativity, open-mindedness, and risk-taking. Students are to brainstorm a myriad of ideas that would fulfil the re-defined need and suspend their judgements. Teachers can introduce various brainstorming tools for this process and should encourage out-of-the-box thinking and a large quantity of ideas. Facilitation may be needed to ease students' anxiety about coming up with the "perfect" ideas, and to ensure that both teacher and students are open to exploring various possibilities, even ones that seem far-fetched and impractical at first.

### Prototyping

Prototypes are preliminary sketches and rough drafts, and are therefore subject to revisions. This is where students begin to turn their ideas into concrete solutions, and the lesson here is this: in order to successfully design a solution that effectively solves a problem, the designer must put ideas into action, so "failing" early and often is an essential part of the process. It is important for teachers to help students understand that design can be a lengthy process and that iterations are necessary. Rather than putting down correct answers on an exam paper, success in the real world usually comes after trials and errors; it behoves students to internalise this mindset early on.

### Testing

There cannot be an iterative process in prototyping without testing. After each version of the prototype, students are to go back to the beneficiaries for whom they are designing the solution, gather their feedback, and then modify the prototype. Students must learn to communicate and collaborate effectively with each other and with their target beneficiaries in order to produce a successful final product.

### A Process Worth Pursuing

Students and teachers may initially find design thinking rather challenging because it requires one to cross conventional boundaries, question one's assumptions and constantly navigate ambiguity, none of which are regular practices in traditional Asian classrooms. However, these skills are critical for future societal and economic growth. In order to help young Asians cultivate these 21st century skills before they join the labour market, schools can utilise design thinking to improve student learning in and outside of their classrooms. ■

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# Climate Action: Simply Good Business

CHAN SUE MENG



“Let **no one be discouraged** by the belief there is nothing one person can do against the enormous array of **the world's ills, misery, ignorance, and violence**. Few will have the **greatness to bend history**, but each of us can **work to change a small portion of events**. And in **the total of all those acts** will be written the **history of a generation**.”

ROBERT F. KENNEDY

## Power of One

The environment provides us with air to breathe, water to drink and resources to maintain our way of life. But all of us — from individuals through to huge multinational companies — are destroying it daily through our collective actions. None of these actions on its own is significant but taken together they are a disaster for mankind. We are not just spoiling the environment for our daughters and grandsons, but also digging our collective mass grave.

Where to start? What can we possibly do when faced with such a huge problem? Whenever I speak of climate action and responsible business conduct with small and medium-sized enterprises — which collectively account for an overwhelming 98 per cent or more of all enterprises in most countries — I hear the same themes emerging: "dollars and cents first", "no budget" and above all, "we are too small to make a difference" (Vandenberg, Chantapacdepong, & Yoshino, 2016).

The irony is that SMEs are the most vulnerable to natural disasters (AXA Group, UNEPIF, PSII, 2016, p.3). And it is SMEs that will pay most dearly in Asia since it is this continent that will be most at-risk from climate change.

If the SMEs believe they cannot make a difference, we are all doomed. Yet, SMEs are fighting back! I was particularly inspired by Sunfresh, a Singapore-based producer of fruit juices sold across the Asia-Pacific region, who are reducing waste and cost whilst also benefiting the environment with "Actions that doesn't cost the earth" (Sunfresh, n.d.).

Indeed this is the most compelling reason for doing your part; it's simply good business.

## Good Business

Over a period of four years, Sunfresh's initiatives to reduce, reuse, recycle and replace material across operations not only created a positive impact on the environment, but also brought about annual savings of around US\$38,000 (Sunfresh, n.d.).

Sunfresh's biggest cost-saving initiative and the one that also had the largest impact on the environment came from using reusable paper cartons in the transportation of its goods. This simple initiative has saved an estimated 21.7 tons of paper packaging each year, which is equivalent to nearly US\$27,000 (Sunfresh, n.d.).

Their award-winning green initiatives have helped Sunfresh to win big clients such as Marina Bay Sands. As Andrew Webster, then COO said

in an interview, "People look at going green as a cost centre, but it's not. It gives us a commercial advantage" (Kan, 2014).

## Triple Bottom Lines (3Ps)

It used to be frowned upon to make profits whilst doing good, but times have changed. Today, companies need to think about the 3Ps — profitability (direct and indirect), people (society) and planet (environment). Big companies present their plans to reduce their environmental footprint, whereas much of the plan can also be viewed as big profit generators or plain cost-cutting from resources that are already factored into products and services.

With taxes increasingly imposed on consumers in Asia today (in Europe, especially in Nordic countries, this has been going on for many years), and suppliers reinventing themselves, the ubiquitous supermarket plastic bag may soon become a collectors' item. The Conversation, an independent news and commentary site, estimates that Australia's consumption of almost 6 billion plastic bags a year will immediately drop by 80 per cent with discontinuation of free bags bringing savings exceeding US\$130 million annually. By offering a more durable version at US12 cents, an intention announced by the country's two supermarket giants, Woolworths and Coles in 2017, the retail industry is expected to have a new revenue stream with gross profit of US\$56 million through sale of 1.18 billion units (Mortimer, 2017).

Singapore telecommunications provider SingTel's green consumer initiative "Help the Earth, go electronic!" imposes US41 cents per paper invoice. If half of their 4.1 million Singapore subscribers choose paper invoices every month, and the other half goes e-pay, imagine how much more profit and cost-savings are created that help the environment.

## Walking the Talk

We don't choose our parents, children or relatives, but we choose people for almost every other important relationship we wish to establish, including our employer. According to findings of Deloitte Global Millennial Survey, "purpose" is to the millennial what career longevity was to earlier generations, with 76 per cent of them looking to work with organisations that have a clear sense of purpose that impact society in a positive manner (Hurst, 2017). Climate change is an issue of great concern to this group (Thomas, 2015), who look for companies with genuine green credentials, not those that pay lip service to the environment for the purpose of publicity.

# Impact Assessment and Communications

## 1 Internal processes

The same "track, assess and report" process that is implemented for cost-cutting measures must be applied to measures to reduce environmental footprint in the organisation. They include but are not limited to possibly existing cost-cutting programmes such as moving client documents to e-files, printing on both sides of papers, purchasing recycled ink cartridges, reusable cutlery, turning off lights, air-conditioning and equipment when not in use, redecorating to optimise natural lighting and purchasing large tanks of drinking water instead of small bottles.

Further actions include assessment of how the processes of reducing, reusing, recycling, replacing and/or offsetting can be deepened or intensified across the company. In a brainstorming exercise with a client, their enthused employees came up with a great initiative to collect and track the number of stamps from incoming mail and donate them for sale to raise funds for disadvantaged communities, an initiative that scaled up to involve clients and suppliers, which then multiplied the impact for the beneficiaries. More stamps meant more paper saved, and a great deal of respect all round, that in turned boosted employees' morale and pride in the organisation.

## 2 Close the loop

Responsible business also includes educating the customers, all the way to the end user. Plastic bags for example are not harmful, but it is the consumers who misuse them that is bringing the end to the bag. As Sunfresh says: "We are trying to get our hotel customers to close the loop by putting the [plastic juice] bottle back in the crate to make sure it is recycled" (Kan, 2014). Nespresso encourages customers to return used capsules in its specially created recycling bag. For each bagful of capsules returned, Nespresso provides a meal to a needy person and a discount for organic goods. The return policy contributes to the company's efforts to manage carbon footprint, that has reportedly decreased by 20.7 per cent since 2009 ([Nespresso.com](http://Nespresso.com), n.d.).

## 3 Talk your walk

Action has to come with communication, and too often, we implement and carry on programmes and agendas with a lot of presumption that our actions speak for themselves. On the contrary, without sufficient time allocated to communicating change, consistently, to our stakeholders, the most promising programmes remain promises or failures. Sharing creates clarity, inspiration, inclusivity and accountability and buy-in.

Amicorp, a boutique fiduciary services firm, acquired land to plant trees to offset flying emissions as a group. Part of the budget for this initiative came from reducing flying, especially for internal meetings and training, using instead video-conferencing.

The firm began its Ami-Carbon Offset initiative in 2013, tracking, reporting and offsetting the production of air travel incurred by employees in the course of business. Bookings were centralised to its travel desk, and in the nature of SMEs where ownership and management are not separated to the extent seen in large companies, travel required approval of its Singapore-based founder and CEO, Toine Knipping. After doing the math on oxygen consumption in air travel based on CO<sub>2</sub> per flight, and based on the speed at which trees grow in Chile, the chosen destination to plant for offsetting, and the amount of oxygen they can be expected to produce over their lifecycle, they committed to planting one tree for every 1,000 kilometres flown by their employees and began making financial provisions of US\$5 per tree for land, planting and nurturing.

E-tickets issued to the travelling employees are accompanied by the following (sample) advice:

### Soaring High, Living Green

*This 9,729-kilometre trip produces 989.60 kgs of carbon from jet fuel emissions that harm the environment. It takes the oxygen produced by 10 trees during a year to minimize this impact. The company commits on your behalf to plant one tree for every 1,000 kms of all your air travel. We will do this for you and with you in a joint effort to stand out for a greener tomorrow. Fill these miles with smiles.*

*Wishing you a safe trip – Fly, Plant and Rebalance*

Three years of tracking found that air travel amounted to an estimated 10,109,451 kilometres annually, incurring 808,564 kilogrammes (808 tons) of CO<sub>2</sub> that required oxygen released by 10,109 fully grown trees annually to offset. In 2016, nearly 50 hectares of land (slightly larger than the Vatican City) was acquired and mass planting commenced in 2017.

"We decided long ago that our small company should become a green company, having no negative impact on the environment, or the economy", shares Knipping (2017).

### Resource Creation

In 2010 in China, I developed an environmentally friendlier MICE (Meeting, Incentive, Convention and Events) programme that enabled

clients to track (reduced) emissions, channel percentage of their revenue into green education and receive instant recognition.

The budget to launch and promote the service came from reallocating funds for advertising and promotion, human resources and sales divisions, with the justification that the initiative would forge closer division collaboration, and achieve multiple bottomlines with one action, e.g., boost in employee pride, acquire new talent and clients, and radical though it might be, self-generate funds for green education, and save time from organising multiple events that could be channelled into employees' work-life balance time, delivering yet another edge over the competition in talent acquisition. The business case made it possible to engage a big MNC as a client, which in turn validated my then employer's leadership position in this unique service offer in the city. Early takers of the programme included GE Capital Aviation Services, and the Climate Change Department of China's highest planning body, the National Development and Reform Commission.

#### Other Resources

Resources come in kind too. They include human, i.e., the management, board members, clients and suppliers; and companies in the same building and their collective concern for climate change; their passion; time; expertise; connections; experience; products and services. Perhaps the lowest-hanging fruits are the employees, the millennials that are expected to comprise 46 per cent of the workforce by 2020, mostly burning to make a difference with their careers (Jayaram, 2015).

Working with the trade and commercial chambers can also scale up impact, create dialogue and networking to share best practices. For example, a study conducted about CSR and SMEs found that environmental policies of small businesses in the Netherlands exceeded international agreements due to the support of trade associations that served as advisors and information providers (Linh, 2011).

Renowned Kenyan environmental political activist Wangari Maathai's devotion to the cause of saving the forests of Kenya made her the first African woman to win the Nobel Peace Prize. She shared a story about a hummingbird:

*There's a huge fire in the forest and all the animals run out to escape. But the hummingbird stays, flying to and from a nearby river carrying water in its beak to put on the fire. The animals laugh and mock this little hummingbird. They say — the fire is so big, you can't do anything. But the hummingbird replies — I'm doing what I can. There is always something we can do. You can always carry a little water in your beak. ■*



"Today, companies need to think about the **3Ps** — **profitability** (direct and indirect), **people** (society) and **planet** (environment)."

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*Chan Sue Meng is founder of Green Shoots Communications, which provides strategic social impact and communications consulting to help corporates realise aspirations to drive social impact in meaningful, manageable and measurable ways.*

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# Singapore's Energy Dilemma: Would the Nuclear Option Help?

LIM SOON HENG AND  
PROFESSOR JACOPO BUONGIORNO



## Singapore's Energy Dilemma

Singapore's economic health hinges on two crucial imported resources—water and energy. While the importance of the first is seared in the public mind, the criticality of the second is appreciated only by a few. A disruption to our energy supply would have dire consequences on our economy as well as our defence capability.

More than 95 per cent of every joule of electricity is derived from natural gas. Of that, only a small proportion is transported here by LNG tankers. The bulk is piped from Indonesia and Malaysia. The existential threat of the latter has hardly been aired in public. Is the supply chain robust? Technical mishaps, sabotage, depletion of gas deposits, market pressures, and political backlash, resentment and discord with our neighbours next door are all potential threats.

Indonesia, Southeast Asia's largest economy, has morphed from an exporter to a net importer of oil. It is expected to be a net importer of natural gas by 2020 according to a 2017 article in Reuters. Malaysia inked a US\$25 billion agreement to sell liquefied natural gas to China for 25 years. It also reached an agreement in October 2017 to sell 2.5 million tonnes of the same to Japan annually. The world's second and third largest economies are soaking up fossil energy like a sponge right at our doorstep. The prospect of one, if not both, pipelines running dry by about 2020 is too serious to ignore.

Singapore is constrained by a number of factors, which reduces the viability of solar and wind as baseload alternatives. The truth is that we cannot overly rely on these baseline alternatives. Instead, we need to take a quantum leap for energy diversification.

Our 193 km of shoreline is practically fully developed. Finding waterfront land to build more LNG gas terminals safely has become a challenge. The western shorelines where most of the power plants are sited are close to capacity, while the northeast coast line is too close to population centres as well as Changi Airport.

Gas cannot be easily stockpiled. It requires large tracks of land, even if below ground, making it impractical as a strategic reserve for a small city-state. This lack of a strategic reserve compromises the country's defence capability.

We need to accelerate our pace towards nuclear energy. The path to a nuclear power capability is long. Even if the government gives the thumbs up, it would be at least a decade before the first nuclear power plant comes online. "Let's wait for new nuclear technologies" is a common refrain even among experts. Although China and India have invested heavily in nuclear innovations, these new technologies are still in the experimental phase, and will take 10 years or more before commercialisation.

Every year of delay towards energy independence is a year of exposure risk to our economy. Fissile material is much more easily stockpiled than gas, and that enhances the resilience of our economy as well as our defence capability in a prolonged war.

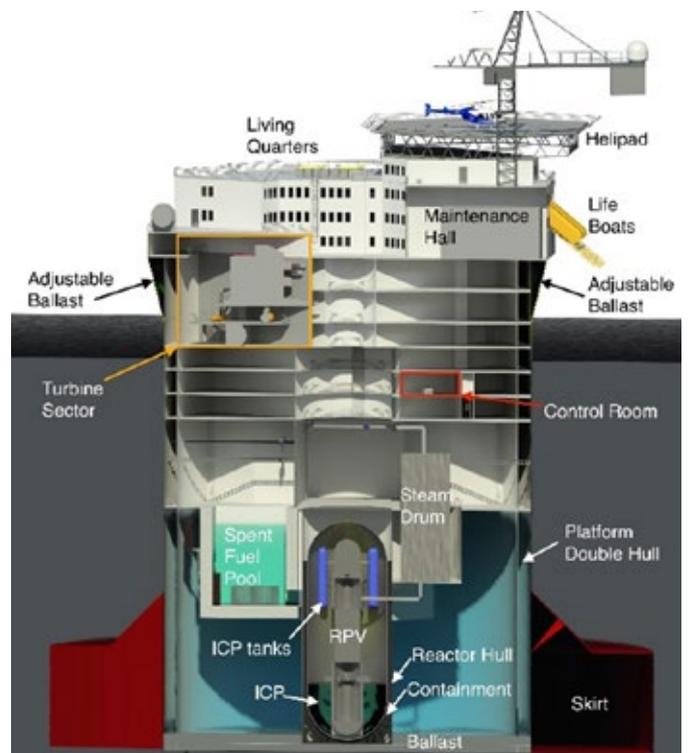
There is a potential solution, which we believe has not been fully considered—an offshore nuclear power plant. The Massachusetts Institute of Technology (MIT) has worked on it for some years and one of the co-authors of this essay, Professor Jacopo Buongiorno, had shared it in a public talk supported by The HEAD Foundation on 16 January 2018, at the National University of Singapore.

### Offshore Nuclear Power Plant

MIT's Offshore Nuclear Plant (ONP) concept offers the potential of a new, economically attractive model for construction, siting, operations and decommissioning of nuclear plants, which could be particularly suitable for application to Singapore.



▲ Figure 1: The proposed offshore Floating Nuclear Plant structure. Source: MIT News



▲ Figure 2: The nuclear reactor and related safety systems of the proposed offshore Floating Nuclear Power Plant. Source: MIT News

"The **truth** is that we **cannot overly rely** on these **baseline alternatives**. Instead, we **need** to take a **quantum leap** for **energy diversification**."

This concept integrates a nuclear reactor within an offshore platform. Several features produce an attractive design. First, the ONP can be entirely constructed in a shipyard and then towed to the site, where it can be anchored off the coast. The plant is connected to the grid via an underwater AC transmission line, such that the only structure on land is the electric switchyard. Therefore, land usage is reduced to virtually zero, making it particularly suitable for land-scarce countries like Singapore. Second, the ONP reactor is below the water line, with easy access to the ocean heat sink; the system is designed to require no external intervention in order to maintain reactor cooling during all postulated accidents, including a prolonged station blackout. Therefore, a Fukushima-type scenario is not possible. Third, the ONP's main structure is a simple cylindrical, partially submerged rig, with a low centre of gravity, offering an excellent compromise between cost and robustness with respect to waves, wind, collision and blast. The ONP concept can accommodate virtually any reactor and power cycle designs, with modifications to the size of the platform.

MIT is now developing the ONP-300, featuring a relatively small reactor designated according to its electric power rating of 300 MW. The water-tight underdeck hosts the reactor, the control room, the spent fuel pool, and other necessary facilities. The steam cycle, equipped with a standard steam turbo-generator, and the crew's living quarters are located right below the main deck. Cooling water is drawn from the bottom of the ocean and discharged slightly above ambient temperature at the surface.

The ONP design aims to exploit the advances and experience in the construction of large offshore structures in the oil and gas industry and naval shipyards. The shipyard model potentially allows decreasing construction time and cost compared to standard nuclear power plants. This fact is crucial in light of the need to reduce the capital cost of nuclear projects. Also, decommissioning is done in a centralised shipyard (just as it happens for the US Navy nuclear submarine and carrier fleets) so that the site can be returned to "green field" conditions after the platform is towed away. The ONP platform's weight and size are well within the capabilities of modern shipyards in Singapore and worldwide. Compared to terrestrial plants, the ONP concept eliminates about 95 per cent of the concrete used in a conventional nuclear power plant, thus reducing cost and removing a major potential source of delays during construction.

### Concluding Remarks

The benefits of adopting nuclear energy to Singapore are numerous and substantial: (i) the electricity supply would become more reliable, resilient to disruption and independent of fossil fuel supplies from neighbouring countries; (ii) electricity prices would be stabilised for decades; (iii) the entire freshwater demand of Singapore could be met

with desalinated water using a single 300-MW nuclear plant<sup>1</sup>; (iv) if all of Singapore's cars were converted to electric vehicles, their energy demand could be covered with only one more 300-MW nuclear plant<sup>2</sup>; and (v) the amount of CO<sub>2</sub> emissions into the atmosphere could be drastically reduced, thus making Singapore a leader in the fight against global warming.

In the longer term, Singapore could use nuclear energy also to generate hydrogen for fuel-cell cars or industrial processes. Lastly, if the ONP design were adopted, the construction of ONP platforms would constitute a sizeable business opportunity for Singapore's shipyards.

There are of course also challenges. For example, siting the ONP platforms away from shipping lanes and ensuring their security will not be trivial. Short- and long-term solutions for management of the high-level radioactive waste produced by the nuclear plants would have to be identified.<sup>3</sup> The development of an independent and effective nuclear regulatory agency, which will oversee the nuclear programme and provide the public with the confidence that nuclear risks are properly managed, will take time. Public acceptance itself will require strong engagement and transparent decision-making; in particular the benefits of nuclear will have to be weighed against its challenges in the public debate. ■

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<sup>1</sup> This assumes a water demand of 1.7 million m<sup>3</sup> per day and a reverse osmosis process operating at 3.5 kWh/m<sup>3</sup>.

<sup>2</sup> This assumes 9.45 billion km travelled per year with an electric vehicle operating at 5.4 km/kWh.

<sup>3</sup> Robust technical solutions (such as dry casks and underground repositories) are available. The primary challenge will be to design a licensing process that is socially acceptable.



# When Turbulent Air Meets a City Dweller: The Science of Urban Sustainability and Liveability

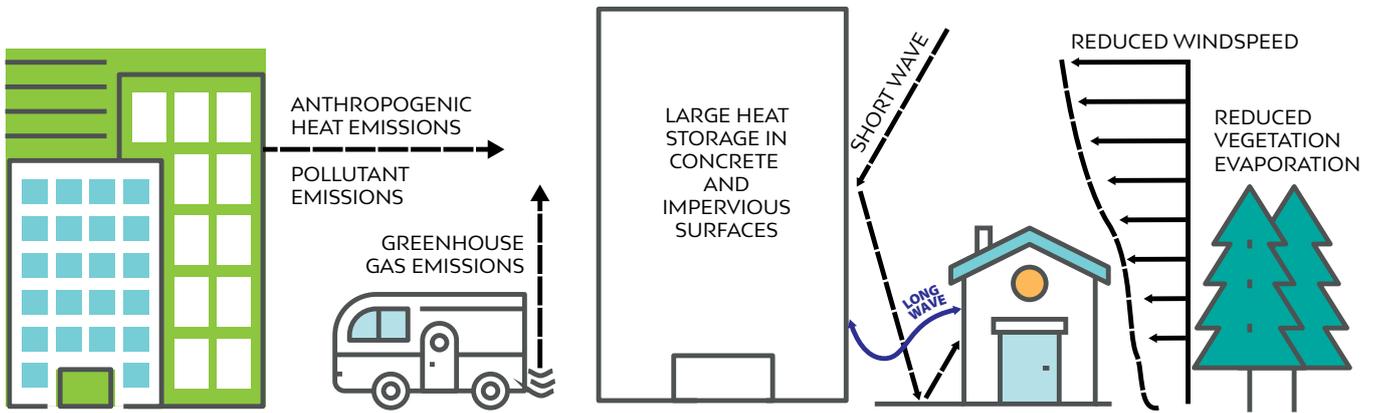
QI LI

**W**e quite often hear the word "turbulence" when we are in an aircraft, flying 30,000 feet above the ground. However, as people are fastening their seatbelts, most of them probably do not realise that turbulent fluid flow is so ubiquitously encountered in everyone's life.

Almost all kinds of human activities on the Earth's surface are immersed in the atmospheric boundary layer (ABL), the layer of air approximately 1–2 kilometres above the surface of the earth, which is almost always turbulent. Working in the interdisciplinary field of micrometeorology (i.e., studying weather patterns in a short time scale, say, 30 minutes), atmospheric sciences and engineering, I study dynamics of this "thin" layer of air.

Winds in the ABL are an important source of renewable energy. The winds, or turbulent air flows, are powerful in transferring the near-surface water vapour to upper atmosphere and water returns to earth through precipitation, which are essential components of the global water cycle. In addition, any numerical weather predictions and future climate projections need to account for dynamics of the ABL in order to represent how the Earth's surface is coupled to the atmosphere. These are just a few examples of why we are motivated to study the ABL and the land-atmosphere interactions.

To me, this field of study is interesting and important because it is through this very thin layer of air that anthropogenic (i.e., relating to humans) land use, land cover change (e.g., urbanisation), and perturbations to the air (e.g., release of greenhouse gases) ultimately impact earth's climate system.



▲Figure 1: A schematic diagram showing modifications of the environment by cities

More than half of the world's population now live in cities and the trend of urbanisation continues, driven by political, social and economic factors. Its impact on the earth system and climate is profound. Cities only occupy a small fraction of the Earth's surface, but they significantly transform the local environment and their impact on the earth system extends beyond city boundaries. The *urban heat island effect*, which refers to the air temperature in the city core being higher than the surrounding rural areas, was first reported in the 19th century in London by Luke Howard. Records of cities' "signature" on occurrences of summer storm dated back in the 1960s. Pollutants from the cities can also impact regions downwind from the sources.

In terms of resource consumption, cities account for 75 per cent of total energy use and 80 per cent of greenhouse gas emissions. Under a changing climate and a higher frequency of extreme weather events (e.g., heat waves, cold spells, extreme rainfalls and hurricanes), cities can be particularly vulnerable. Urban areas are also well known for many health hazards, such as degraded air quality and stressful lifestyle.

The quality of the air that every city dweller breathes has crucial health implications. As the urban population increases and as urbanisation imposes drastic anthropogenic changes to land cover, it is important to understand and be able to predict land-atmosphere interactions in spatial scales that are relevant to city dwellers. More broadly speaking, being able to *quantify* the exchanges of energy, momentum, water and gases within a city and with its climate system, is one of the building blocks of sustainable and resilient infrastructures in the built environment.

How are we doing so far? The answer is "in the turbulent wind". Turbulence, as a natural phenomenon, is paramount in the study of ABL dynamics and city-atmosphere interactions. However, turbulence remains an unsolved problem in classical mechanics.

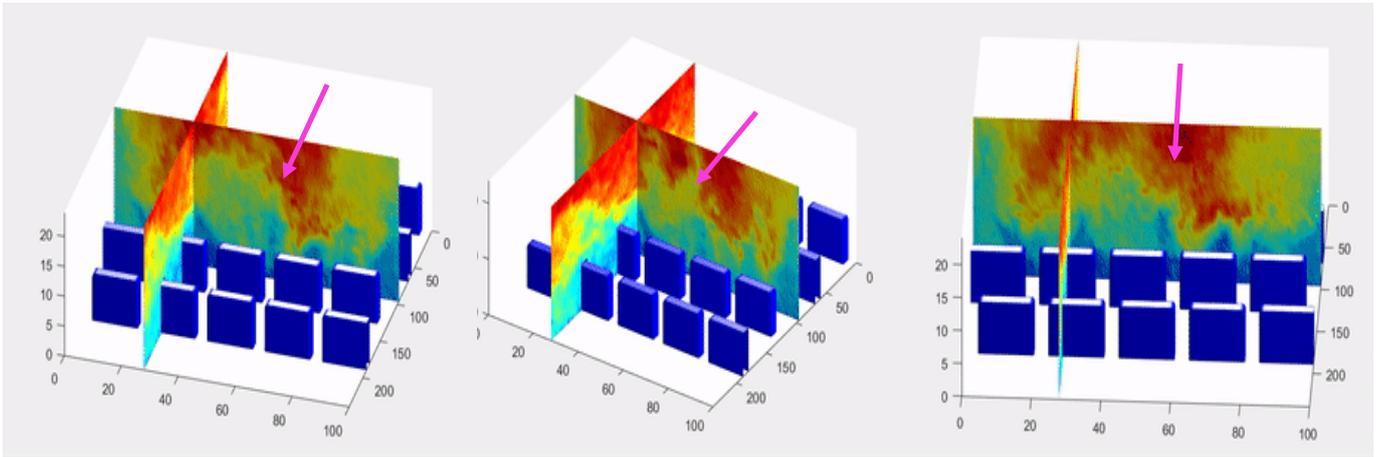
In the past few centuries, artists such as Leonardo da Vinci have delicately sketched the irregular and chaotic features of water from fountains. These complicated turbulent flow patterns, which seem

to be totally intractable, are actually governed by the Navier-Stokes equations. In other words, if one can shrink oneself and tag along a fluid parcel, one will be able to predict one's exact path using the Navier-Stokes equations, provided one's initial position and other necessary information about the boundary of the flow are *accurately* known.

However, solutions to the Navier-Stokes equations show a strong sensitivity to initial conditions, boundary conditions and any driving forces. For example, even an inaccuracy in the molecular scale in the initial position could lead to errors in the long-term prediction of the resulting path. For example, when a puff of pollutants from traffic emission on a major road is dispersed "in the wind" and transported into the pedestrian lanes, predicting its concentration accurately after a certain period of time is extremely difficult.

In order to quantify and predict the interactions between urban *urbes* and the lower atmosphere, we need to study the turbulent wind. The turbulent wind (or you can think of them as air parcels moving randomly) can be interpreted as being comprised of swirling eddies of a large range of scales. In Figure 1, the schematic diagram shows that buildings as well as trees exert a drag force that reduces the wind speed. It may require some imagination to visualise the chaotic motions of swirling eddies "superimposed" on Figure 1.

Figure 2 illustrates a snapshot of wind over an array of buildings in a vertical cross-section plotted from computational fluid dynamics modelling called *large-eddy simulation*. The streamlines are tangential to the wind vectors, and the colours indicate temperature distribution. The technique of large-eddy simulation, as its name suggests, computes the dynamics of large eddies while modelling the small-scale ones. The smallest of the large eddies has a dimension that is commensurate with the size of a person. This state-of-the-art technique therefore offers the unprecedented opportunity to understand and quantify the impact of turbulent wind on phenomena pertinent to "human-scale". On the other hand, the upper bound of the large eddies is representative of the large-scale dynamics of the turbulent atmospheric boundary layer.



▲ **Figure 2:** Snapshots from numerical simulations showing the horizontal component of the wind vector, with direction indicated by the magenta arrows. Hotter colour indicates higher wind.

Let's use a simple example to illustrate how computational tools like the *large-eddy simulation* provide new insight into multi-scale interactions between humans, city and the atmosphere. In a tropical city like Singapore, the high level of ambient humidity often makes people feel uncomfortable. Abundant vegetation in the "garden state" can further increase the humidity level due to transpiration.

Given the high computing power we have today, it is now feasible to simulate how water vapour is transported by turbulent wind to the atmospheric boundary layer from a district as large as 20–30 square kilometres. Higher water vapour concentration means a high level of humidity. We can also assess how synoptic-scale weather events such as a heatwave impacts the water vapour distribution in this district. In addition, since we understand how turbulent wind is "stirring" water vapour at the human-scale, it is possible to explicitly estimate city dwellers' comfort level. The comfort level can vary with one's location, time of the day, synoptic-scale weather events, different street layouts, roads and vegetation patterns, etc.

Quantitative studies allow us to explore factors that impact the interactions between urban centres and atmosphere by dynamically simulating the physical processes in various spatial scales. This in turn enables decision-making at policy and planning levels — such as increasing vegetation coverage or demolishing older buildings to build a new infrastructure — through "hypothetical scenario studies". It will also allow systematic cost-benefit analyses from different perspectives based on "multi-scale information" about humidity level.

For example, in addition to considering the comfort level of city dwellers, the negative impact of high moisture level to building facades can also be taken into account from the perspective of maintenance cost. Eventually, with state-of-the-art computational tools, we can quantitatively evaluate district-level green policies and environmental measures for the enhancement of urban sustainability and liveability.

Challenges still remain, both in theoretical development of turbulence analysis and practical applications to solve real-world problems

More broadly speaking, being able to **quantify the exchanges of energy, momentum, water and gases** within a city and with its **climate system**, is one of the **building blocks of sustainable and resilient infrastructures** in the built environment.

in cities. Although numerical modelling tools are useful, live observations in cities with new instruments, sensors and technology are also extremely valuable. Large datasets collected on-site contain rich information such as turbulent wind measurement, temperature, humidity, pollutant concentration, greenhouse gases emission rate and building energy consumption. One may surmise that the fusion of sophisticated numerical model with large datasets presents exciting opportunities for new understanding in human-city-atmosphere interactions. This will eventually bring about innovative solutions to urban sustainability. There is a long way to go but we are motivated by the "answers in the wind". ■

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# The New Asian Workplace

— Who Will Take Charge? —

DR BOB AUBREY  
AND SRIVEN NAIDU

*This article describes the imperative for developing new models/paradigms for human development by highlighting changes affecting work, particularly in the Asian workplace.*

*We suggest that transformations in the human lifecycle, new forms of employment, and the impact of technology on jobs and education will affect populations old and young, in countries rich and poor. These changes mean nothing less than the reinvention of HR in companies and present a challenge for Asian thought leadership.*

### The Free Workforce: Employment as Enterprise

The idea that work is a form of development is an essential part of the United Nations' view of human development. The International Labour Organization, as the only tripartite UN agency since 1919 bringing together governments, employers and workers from its 187 member states, has defined its mission as promoting "decent work":

*Decent work sums up the aspirations of people in their working lives. It involves opportunities for work that is productive and delivers a fair income, security in the workplace and social protection for families; better prospects for personal development and social integration; freedom for people to express their concerns, organise and participate in the decisions that affect their lives; and equality of opportunity and treatment for all women and men.<sup>1</sup>*

Today it appears that the concept of "decent work" is rapidly shifting from employment as a job to a "free workforce" where self-employed and self-managed workers seek out work in a new form. It is observed that companies now are often managing a multitude of workers through a diverse range of contracts. A work team can have an employee, a temp, a part-timer, an intern, an outsourced worker, a self-employed freelancer, a consultant and a contract HR.

Traditional work is being disrupted as two trends come together:

1. Companies are shifting to a contingent workforce using self-employed workers to replace full-time employees.
2. Most workers will have to work in new combinations of people, artificial intelligence and robotics. Technology is less about jobs being replaced and more about using the new capabilities of machines in work.

In fact, the consulting firm Accenture has published a report predicting that "[w]ithin 10 years, we will see a new Global 2000 company with no full-time employees outside of the C-suite."<sup>2</sup>

For people in the "free workforce", the idea of a career as a series of jobs with ascending responsibilities in the same company until retirement is no longer a reality. For these people, career development is largely entrepreneurial — which means that along with this freedom, the responsibility and cost of training, health insurance, retirement and unemployment insurance has shifted to the individual.

Singapore is an instructive case. Why? Because government policies have embraced the free workforce model more rapidly than we might think. Research findings published by the global recruitment

**"What we believe is that Asia can and must take the lead in dealing with the new issues of human development. Alongside the growing importance of China and India, one of the many questions will be, "How can Southeast Asian businesses develop their own management models and workforce development to take leadership on the global stage?"**

consultancy, Page Personnel Singapore, reveal that in Singapore 60 per cent of professionals polled are willing to accept a contract role if they remain unemployed for an extended period.<sup>3</sup> Those surveyed indicated that the downside of accepting a contracting role were primarily job insecurity (26 per cent), lack of employee benefits (24 per cent) and a lower sense of belonging in a company (23 per cent).

### The New Idea of Lifelong Learning

Lifelong learning is a late 20th century idea. In 1972, UNESCO published the *Faure Report* with a definition of lifelong learning that underlined the responsibility of adults for their own education:

*The term "lifelong education and learning" denotes an overall scheme aimed both at restructuring the existing education system and at developing the entire educational potential outside the education system; in such a scheme men and women are the agents of their own education.<sup>4</sup>*

In those days, lifelong learning was seen as a goal in a "live to learn" society; and the most important philosophical question being debated about the future of work was, "What will we do with all of our leisure time?"<sup>5</sup>

Learning geared towards the individual employee's "lifelong employability" is actually a recent phenomenon. Even until the 1990s, corporate training for employees was considered the primary source for providing effective learning to maintain employability. But in today's world of work, adults have to find ways to keep learning and adapting to changes during a whole lifetime, irrespective of their initial education level. Part of the need for lifelong learning is due to increased longevity, which is playing havoc with government-defined retirement ages (age 60 for men in China and 56 in Indonesia

as of 2017). Besides intrinsic enjoyment, adults will keep learning much longer than current earlier retirement ages in most countries — not only because of the necessity for earning an income but also because they want to interact with others and be recognised for their value contribution.

While lifelong learning and development is an individual responsibility, it cannot be optimally managed as an individual initiative. Companies have to manage the free workforce and lifelong learning to remain competitive.

This means that they have to redefine a profession with an archaic name that reveals the underlying assumption about people at work its practitioners must shed: "Human Resources".

However, in these new free workforce models, HR responsibility does not extend to all workers. Take for example the Singapore-based ride-hailing company Grab, which was created as recently as 2012. In addition to full-time employees, its "multi-speed" workforce now has 1.3 million "partners" who drive taxis and delivery vans in most Southeast Asian countries — and whose engagement with Grab is *not* managed by its HR function.<sup>6</sup>

### The Disruption of HR

With the shift to the free workforce where workers are responsible for managing their own learning and development, the familiar roles of HR business partner and administrative functions are in question.

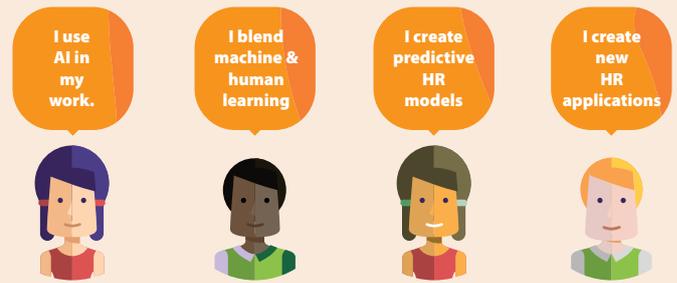
At this point nobody knows exactly what HR will look like in the future. However, the world's oldest association of people professionals — the Chartered Institute of Personnel and Development (CIPD) — concludes that companies will continue to use professionals who can manage the needs of the workforce of an organisation — for both salaried and free workers.

The CIPD has been conducting research on what the future of HR will be, and even questions whether HR will soon require a different name.<sup>7</sup>

It is likely that HR headcount will be reduced in companies and HR professionals will find themselves in the free workforce like almost everyone else. Some HR work will be outsourced, some will be organised on a project basis, and much of it will be done by managers and workers themselves.

With these changes, companies will be looking for HR strategists who can manage this new multi-speed workforce, and will recruit individuals with new profiles, such as, say, a degree in psychology and artificial intelligence. IBM's HR is already integrating a new way of managing their workforce by using their Watson platform.<sup>8</sup>

## Growing new skillsets for HR



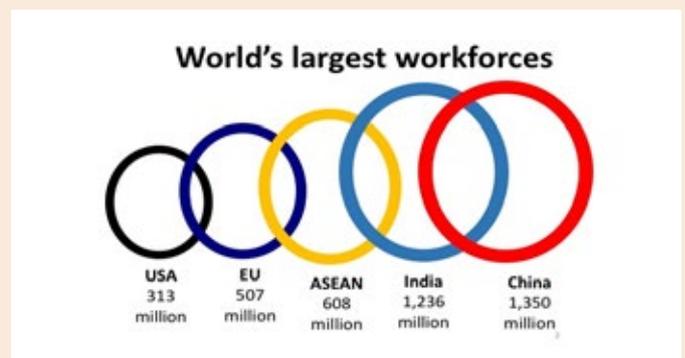
### The Need for Soft Power Leadership in Asia

Today, HR thought leadership and practice are dominated by American corporations, business schools and consultants. If you ask an HR manager in Asia to name a guru of HR who is not American, you are likely to get a blank stare in reply.

Does Asia now have an opportunity to develop innovative approaches to managing people? We think it is not just an opportunity but an imperative. Asian HR professionals need to not only to build a globally competitive workforce in Asia but also project Asian leadership on the global stage.

Power is shifting to Asia at many levels. However, Asian dominance in the "hard-power" of economic and political clout is not being matched by leadership in the "soft power" of management. This gap is a crucial challenge for the global leadership of Asia.

### From Human Resource to Human Development



▲ **From Human Resource to Human Development:** United Nations Department of Economic and Social Affairs. (2017). 2017 Revision of the World Population Prospects

The shift of human-development leadership to Asia is driven by the fact that it has the three largest workforces in the world, i.e., China, India and Southeast Asia. But the hard-power of sheer demographics provides only part of the picture. Large workforces do not necessarily mean leadership in human development.

An equally important hard-power indicator is the fact that the three Asian workforces together produce more university graduates than the rest of the world combined. Other hard-power indicators abound.

# FIVE SHIFTS TO DEVELOP ASIAN THOUGHT LEADERSHIP IN HR



We point to five shifts in human development that will shape how Asian HR can develop global thought leadership. But first, let us be clear about what we mean by "Asian HR". We mean human development leaders grounded in Asia, including both Asian companies and multinationals with an Asian human-development commitment. By "Asian thought leadership" we include the role of governments, education systems and NGOs as well as leadership from professionals in companies.

## 1 Human Development Replaces Human Capital

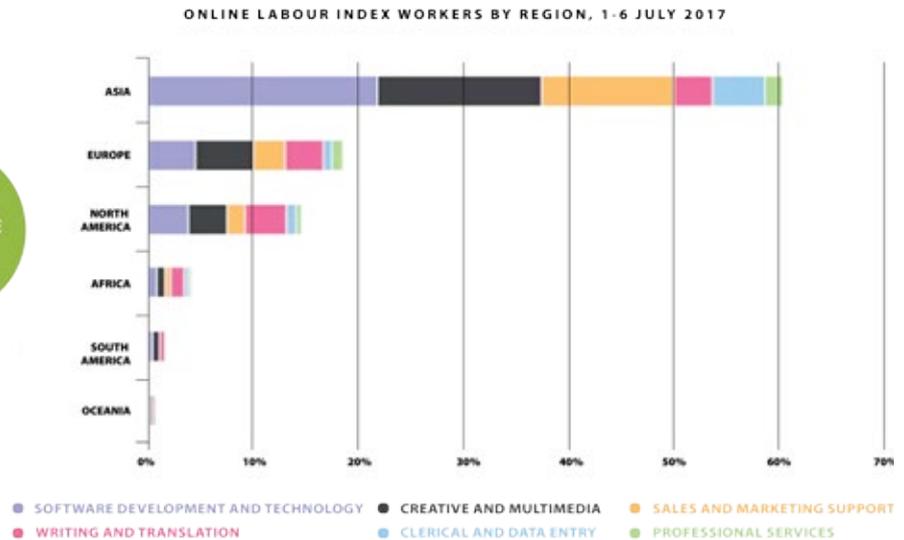
Going beyond human resources is more than just finding a better name. "People professionals" are finding that human capital, with its assumption that only economic criteria define people at work, is no longer adequate. Making work more human(e) as technology changes jobs and jobs shift to freelance work means that people professionals will manage human development as well as performance.

## 2 Ethics and Decent Work

Today, in a well-managed corporation, compliance to legal requirements takes an increasing amount of the HR team's time. This will probably become more automated as HR data moves towards automatically compliant formats. The real problem is the exercise of judgment when it comes to using technology and managing work. Human-development professionals need to be ethics practitioners. For example, across Asia there are very different political and legal frameworks governing personal data harvested by technology. HR thought leaders need to design and update the ethics of companies managing across these countries, no matter where the company's headquarters is based.

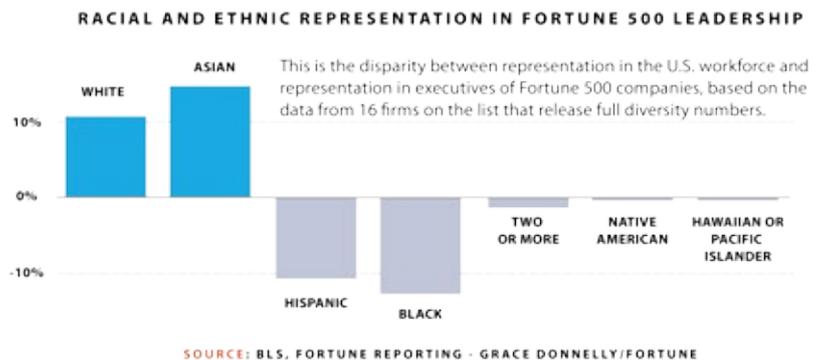
## 3 Workforce Beyond Employees

Developing and managing the work of people who are not employees means that the profession will address the personalised and individualised needs of everyone who contributes work. For the online free workforce, Asia is far ahead of the rest of the world, according to University of Oxford's iLabour Project.<sup>9</sup>



## 4 Shift to Asia

The lag in thought leadership from Asia can be expected to end as a new generation of well-educated and global professionals take key positions in multinational companies, and as Asian companies develop global models that are applied to executives and managers across the globe. Already, Asians lead all other ethnic groups at the top of Fortune 500 companies proportionally to their share of the US population.<sup>10</sup>



The rise of new models in Asia (i.e., China, India and Southeast Asia) may well mean that HR models with a high level of diversity will replace the American standardised "one-size-fits-all" model of HR.

## 5 Self-managed HR

Technology and connectivity mean that a human professional is not needed for HR transactions, just as we have long gone past the need to go to a bank and ask a teller behind a window to cash a cheque. Human-development professionals will not be doing the transactions, but instead manages technology so that people can get the support and answers they need and expect in HR transactions.

First, the three Asian workforces are experiencing faster economic growth and higher productivity growth than the rest of the world. Second, innovation and entrepreneurship have begun to replace the human-resource model based on low-cost manufacturing — "made in Asia" now is becoming "invented in Asia" and even "funded by Asia". Third, in 2017, the amount of Asian capital invested in start-ups has caught up with American investment.

This rapid growth of hard-power in Asia creates a mismatch with its soft power for human development. Why has this happened? First, most HR professionals in Asia have learned their jobs by using concepts and practices from Western multinational companies. (Until recently, a good HR professional was one who could execute what had already been invented in the West.) Second, very few universities have developed advanced HR programmes for strategic HR professionals or set up research programmes in HR.

Developing soft power in human-development leadership would mean Asia producing new and more contextually appropriate human-development ideas and practices compared to the West. Asian human development models can grow out of Asian philosophies — and indeed each of the three Asian workforces can draw on deep philosophical roots, as well as through initiatives and policies. Thought leadership, innovation and successful human-development policies are the new challenges of the Asian Century.

This is the nature of the opportunity for human-development leadership from Asia, for Asia and for the world.

## Conclusion

What we believe is that Asia can and must take the lead in dealing with the new issues of human development. Alongside the growing importance of China and India, one of the many questions will be, "How can Southeast Asian businesses develop their own management models and workforce development to take leadership on the global stage?"

How Asian governments and education systems will support entrepreneurial human development for a free workforce is a "known unknown" — we know they must meet the challenge but we do not know who will be the most effective stakeholders and innovators, or who will take charge. No single corporation, government, think tank or foundation can address the challenges alone.

The nature of this "known unknown" may well be compared to a very, very difficult jigsaw puzzle — where the jigsaw puzzle box's cover (i.e., the solution) has been lost. Given the diversity of Asian cultures, religions and political ideologies, it is clear that the puzzle can fit together in more than one unique way. Some jigsaw pieces

come from a separate puzzle and thus need to be sifted out. Unfortunately, it is not easy to tell which pieces these are. This is why ideas, debates and experiments in Asian thought leadership are needed — to provide an authentic transition from the unknown. Although no one can know fully what the assembled puzzle will look like in the end, it will comprise shared ideas and complementary purposes. ■

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*Sriven Naidu is Director of Programme Development & Partnerships (Masters of Tri-Sector Collaboration) at Singapore Management University and fellow of The HEAD Foundation.*

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1 See the ILO's Decent Work Agenda, <http://www.ilo.org/global/topics/decent-work/lang-en/index.htm>.

2 Accenture, "Technology Vision 2016 — People First: The Primacy of People in the Digital Age," <https://www.accenture.com/gb-en/insight-business-technology-trends-report#References>

3 Page Personnel Singapore collected responses from 3,861 professionals in Singapore on their sentiments towards fixed term employment. Page Personnel Singapore, "3 out of 5 professionals in Singapore will accept a contract role if unable to secure permanent employment," <https://www.pagepersonnel.com.sg/about-us/media-releases/3-out-5-professionals-singapore-will-accept-contract-role-if-unable-secure>.

4 UNESCO has issued a number of ground-breaking reports on lifelong learning, such as *Learning to Be*, Faure Report, 1972; *Learning: The Treasure Within*, Delors Report, 1996 and the more recent *Belém Framework for Action* published in 2010.

5 One of the influential books of the time was *The Leisure Shock* (1981), in which former British trade union leader Clive Jenkins, writing with Barrie Sherman, predicted a dramatic drop in working hours that would create a lifestyle of leisure for workers of industrial societies.

6 This is also true of other ride-hailing companies. Responsibility for Grab's partners lies with "operations" (explained by Ong Chin Yin, Grab's Head of People, at the European Chamber of Commerce HR Committee meeting, Singapore, 26 January 2018)

7 This was the subject of a closed-door session between EuroCham thought leaders and CIPD's Wilson Wong, Head of Insight and Futures, Singapore, 2 May 2017.

8 IBM is piloting many of these innovations in Southeast Asia according to according to Pallavi Srivastava, Asia Pac & Greater China Talent Leader and Global Technology consultant, as shared at a meeting for EuroCham Singapore HR Committee, Singapore, 27 February 2017)

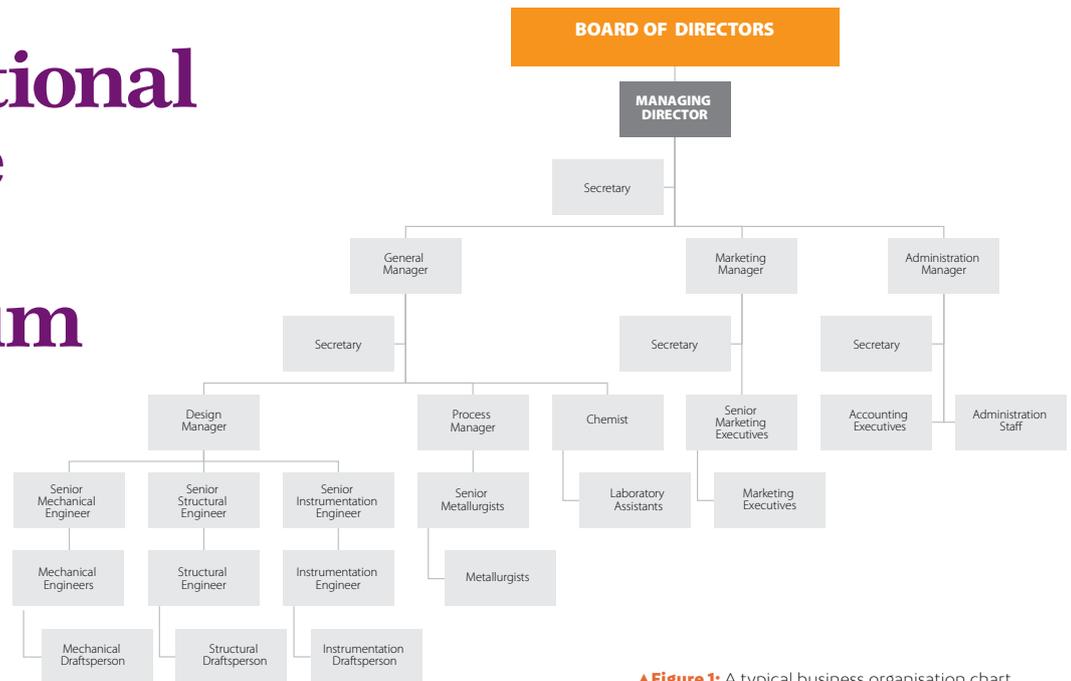
9 Lehdonvirta, V. (2017, 11 July). Where are online workers located? The international division of digital gig work. The iLabour Project. Retrieved from: <http://ilabour.oii.ox.ac.uk/where-are-online-workers-located-the-international-division-of-digital-gig-work/>.

10 The chart appears in a Fortune article by Stacy Jones published 9 June 2017, "White men account for 72% of Corporate Leadership at 16 of the Fortune 500 Companies," a curious title given that most corporate leaders are now Asian, <http://fortune.com/2017/06/09/white-men-senior-executives-fortune-500-companies-diversity-data/>

# Organisational Structure for the Millennium

## The Cellular Concept

JOHN KC TAN



▲ Figure 1: A typical business organisation chart

### An Idea Out of Necessity

The cellular concept was conceived out of the urgent need for me as a project manager to form an efficient project team to supervise the construction of a smelting plant in Peru from 1994 to 1996. I had to form a team, consisting of professionals from various engineering disciplines, cultural backgrounds and differing language proficiency.

When a conventional hierarchical organisational chart (i.e., tree structure) was presented at a staff meeting, dissatisfaction, especially with the line of reporting, was expressed. A local engineer was unhappy that he would have to report to an Australian engineer of lower qualification and who could not communicate in Spanish. An Australian engineer who was a permanent staff from the headquarters was unhappy reporting to a local engineer who was a temporary employee.

As I listened to these complaints, an idea dawned on me. I drew a big circle on the board with small circles representing each member and conveyed that the organisation's structure would take this form. I came to refer to this as the "cellular organisational structure".

Surprisingly, the team members were receptive to this idea and proceeded to work together effectively. Language and cultural barriers were overcome as members willingly helped each other out. The team shared that the spirit of cooperation motivated them the most.

### Traditional workplace organisation

The workplace is a collection of people, without natural relationships, working together for a common goal. Thus, an organisational structure is needed for forming relationships to know and perform

desired duties. Designations are given to indicate levels of authority and responsibility (Figure 1).

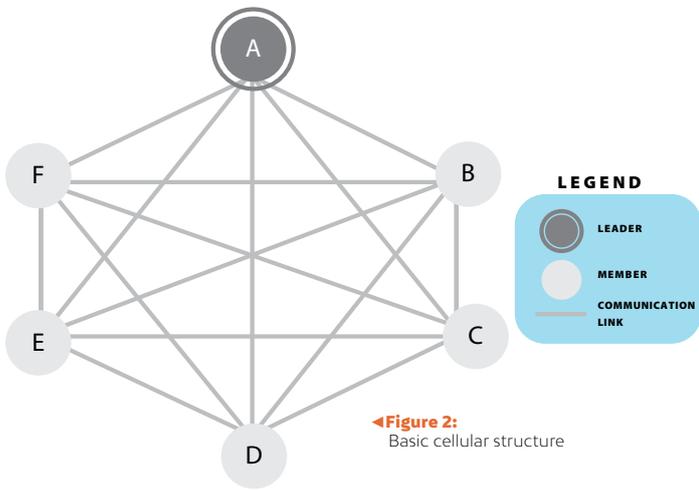
Whilst this structure provides an orderly display of positions, it shows that some positions are lower in the employment ladder.

In industries where personnel are grouped under functional departments, the heads of the division command respect because they are normally well experienced in the required skills of the departments. However, as the complexity of business competition in a global information-driven economy increases, demand for multi-disciplines and skill specialisation becomes more commonplace. Organisations will increasingly require professionals of different disciplines to perform a task.

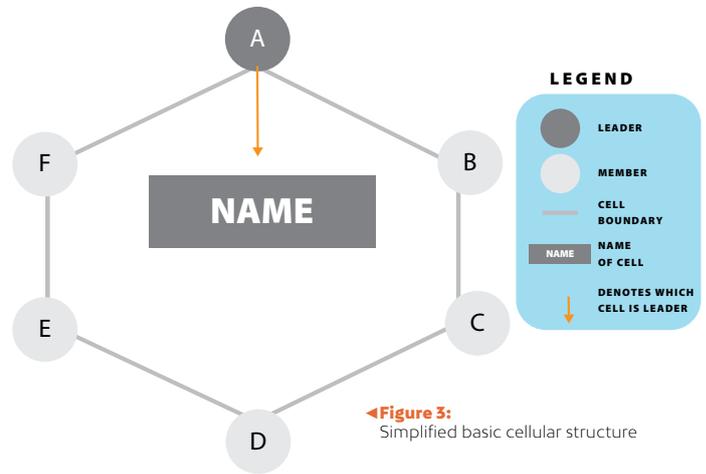
The traditional organisational structure is also increasingly exposing its inability to effectively cohere people. If an employee realises that there are no promotional opportunities in the future, dissatisfaction would certainly ensue.

This dissatisfaction can be averted when an organisation's structure is less hierarchical and when prospective income increment and career recognition are not denied by virtue of personnel position.

What happens when someone who is better qualified or more experienced than their superior is employed? The person may initially be willing to fit themselves to the assigned level but would eventually realise that they can contribute better with more authority. Frustrations from the subordinate and fears from the superior arise if the organisation's structure does not change to accommodate a



◀ Figure 2: Basic cellular structure



◀ Figure 3: Simplified basic cellular structure

particular employee and does not reward subordinates with better benefits than the superior.

Therefore, it is not uncommon to find negative sentiments such as disharmony, jealousy and frequent staff turnover in an organisation with traditional hierarchical structure.

### The Cellular Structure

Given the shortcomings of the traditional hierarchical structure, I would argue that the cellular structure is a viable alternative.

A chairman (i.e., a leader) is needed for a meeting to run smoothly. In a cellular structure, all members are able to interact with one another in a regulated manner as shown by the 15 communication links amongst them (Figure 2). All participants, except the leader, are at the same level and can contribute ideas especially in their field of knowledge. The result is a regulated synergy of ideas and effective communication.

How would this look like as an organisational structure? Figure 3 illustrates the overall linkage between members and resembles the cellular structure for an organ where each cell has its own important function and is bound in a systematic way to serve the main body.

The cell is the basic building block for the organisational structure and each cell is given a name.

### Organisational Diagram Based on Cellular Structure

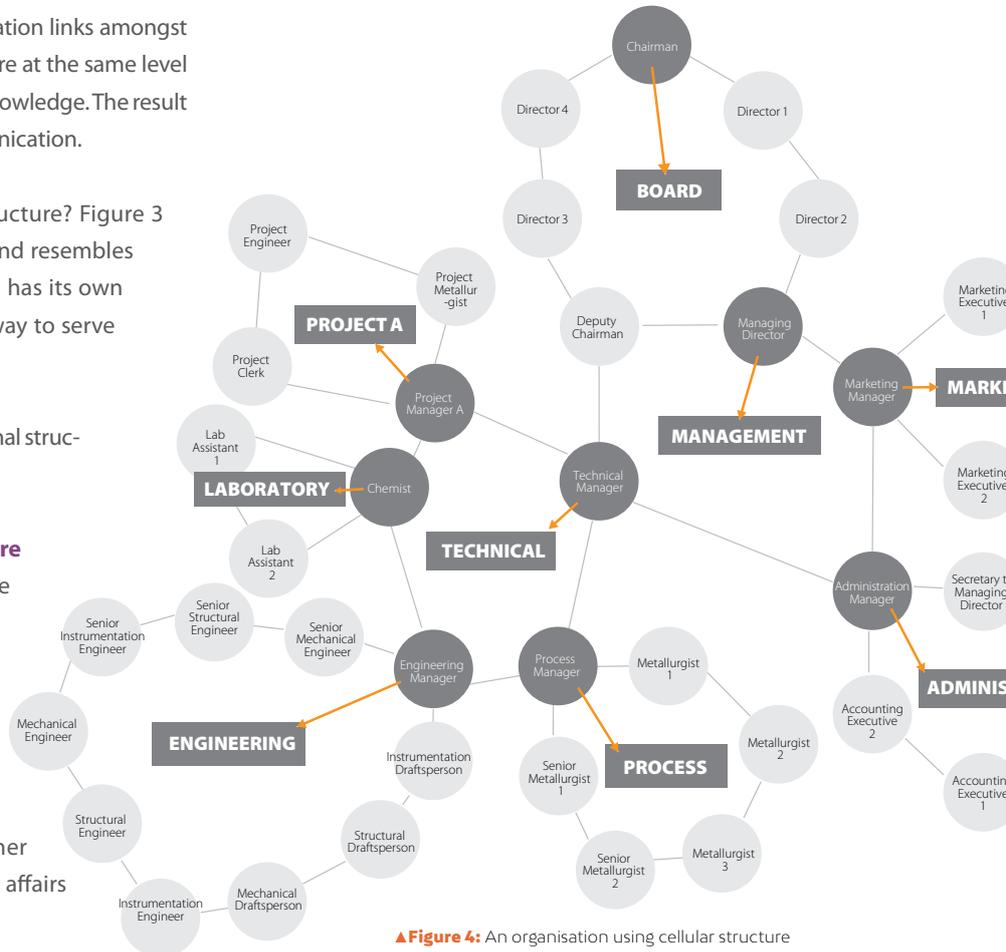
Figure 4 shows an organisational diagram based on the cellular concept. The Board cell is the highest level followed by the Management cell. The Operation cells are of the same level within the organisation.

Note that in this structure, some secretaries are placed in the Administration cell although they serve personnel in others. They can be members of other cells provided that they contribute to running the affairs in these cells.

Notice that a draftsman is now a member of the Engineering cell. This gives them a dignified place in the chart and the right to speak out on matters, especially those related to drafting instead of the traditional impression of being at the bottom of the organisation without say.

The Board is traditionally a cellular structure with members meeting to decide the company's policies. As shown by the Deputy Chairman and Managing Director, it is possible for two members in a cell to belong to a cell of higher hierarchy.

Organisations that constantly handle projects may include full-time project managers in the Technical cell or form a separate Project Cell



▲ Figure 4: An organisation using cellular structure

(Project A cell). An employee can advance his career in the organisation by enhancing their skill (become a specialist or senior member in the level) or become a member of a higher hierarchy but not necessarily a leader of any cell.

### Benefits of Cellular Structure

A good organisational structure by itself does not bring in profits. Rather, it provides a sound platform for human energies in the organisation to be tapped creatively, effectively and efficiently towards achieving the organisation's goals while avoiding internal frictions.

A cellular structure will also empower members to make decisions and work independently.

The employee's innovative potential may be realised to the fullest only in a harmonious atmosphere with mutual respect. This requires "a horizontal organisation and process-oriented management".<sup>1</sup> The cellular structure is such an organisational structure, allowing for innovation management.

### Change for Better

By adopting the cellular structure, we provide, concurrently, a more equitable presentation of and a fresh look at the organizational structure. The tree with superior-subordinate relationship tends to rely excessively on good leadership or on the heads of departments creating a democratic work environment. More often than not, the leadership may actually contribute to the source of disharmony.

Intense competition in the global marketplace today has resulted in greater degree of specialisation among countries.<sup>2</sup> Hence, firms invest in countries with technical expertise and efficient operations. Companies will increasingly have to manage multi-skilled and multi-cultural staff. The cellular structure offers a good way to address this challenge.

I believe that this cellular concept will encourage harmony in organisations. It promotes a better sense of belonging, greater motivation, increase productivity and realises the innovative potential of *people* in organisations, which are important in this age of complex competition. Suffice to say, companies must have organisational structures that do not create master-slave relationships, but rather, encourage a cooperative team spirit to retain talents. ■

**John KC Tan** is a retired senior manager, now residing in Melbourne. He has served in various capacities in Peru, Malaysia, Philippines, China and Australia.

1 Johannessen, J.-A., Olsen, B., & Olaisen, J. (1997). Organizing for Innovation. *Long Range Planning*, 30, 96–109.

2 Archibugi, D., & Michie, J. (1995). The globalization of technology: A new taxonomy. *Cambridge Journal of Economics*, 19, 121–139.

## Guidelines to Establishing a Cellular Structure

A set of guidelines will provide more meaning to the structure:

- 1 The structure is only there to provide an arrangement for the members to work together. It defines their teamwork relationship with others in the organisation. If there are conflicts among members, then the structure must be reviewed to project a more equitable arrangement.
- 2 Superior-subordinate relationship is best avoided. There are only leaders and members (or colleagues) in the cellular structure. The leaders serve as coordinators or facilitators rather than as persons of higher authority.
- 3 The only hierarchy that can exist between cells is that of the Board, Management and Operation cells, i.e., a Board cell is of a higher hierarchy than a Management cell.
- 4 Members are rewarded by their contribution to the organisation, their skills and experience, irrespective of age, gender or any other traits that are irrelevant for the function they perform. Hence it is possible that a specialist, who is a member, is paid at a higher rate than the leader of the cell.
- 5 The designation, authority and duties of each member in the organisation are clearly specified. Authority and responsibility are distributed appropriately amongst members in a cell.
- 6 Leaders are facilitators for the cell. Their duties are to coordinate the works amongst members and stop the passing of the "buck" should things go wrong. They have the authority to assign work to the members. They may be multi-skilled especially in managing others but not necessary specialists in the skills required of the cell.
- 7 Regular meetings are to be held by each cell to review the progress made and plan the work ahead.
- 8 Members report regularly to the leader on existing tasks. Decisions are made with at least two members in the cell being involved and the leader is informed of the decision prior to implementation. A leader shall call for a meeting to discuss any decision if he or she opines that such a decision will affect other members or cells. If members of the cell uphold the decision in the meeting, they may get it endorsed by the leader of the cell of a higher hierarchy in which they are a member. The decision is then final.
- 9 Direct interaction between members of different cells should be encouraged. Inter-cell interactions only through leaders of each cell should be discouraged with the exception of policy matters.

# Preparing For the Future

MAX HITCHINS

In 1995, I was in Sydney where I listened to a speaker who was promoted as a Futurist. His presentation was about something called "The Internet". After the breakfast I said to three of my colleagues: "I think this thing called the 'Internet' could turn out to be a pretty *big* thing. I think we should learn as much as we can about it."

So we approached the speaker and put a proposal to him to have six two-hour monthly sessions with him to learn about the Internet. I thought it would take us about six months to learn all there was to know about the Internet. How wrong was I?

In January 2018, I began my 23rd year of monthly two-hour sessions with this same Futurist — still learning about the Internet. His name is Craig Rispin. He now has clients all around the world who hang on every word he utters about the changes ahead in every industry and every business. In 1995 I well recall Craig saying to me, "Max, the Internet will change everything it touches and it will touch almost everything!" How right was he?

Every opportunity I get I ask Craig, "What's the next *big thing*?" As there is always something new on the horizon he would have wonderful examples. At the most recent session with Craig, in January, he told me of a car I had never heard of, called a Byton. Made in China, the Byton should be released to the world some time in 2019. Already, I think it will be my next car.

At the beginning of 2017 Craig was telling everyone that the use of robots in the hospitality industry was about to increase dramatically. Hilton Hotels started to experiment with robots in 2016.

And if you think robots will never be used in bars, you're wrong! I took my family on a Christmas cruise on the *Ovations of the Seas*. An extremely popular bar on the ship was the Robot Bar. You simply place your order on the nearby iPad and watch the robots prepare your drink.

My format for thinking about, investing in and preparing for the future, is to learn from the past. Can you imagine the opportunities that abounded when the first printing press was invented in 1440? Or throughout the Industrial Revolution that began around 1760? Or, when the first telephone was invented in 1877? Or when the first light

bulb was invented in 1879? Can you imagine the opportunities that were there for smart thinkers?

Think about aeroplanes. It was a little over 100 years ago (1903 to be precise) when the first powered flight happened. Wilbur Wright flew for 59 seconds over 852 feet. By 1969 man had landed on the moon. Today the Airbus 380 can carry 852 people and fly from Sydney to New York in 22 hours and 25 minutes. That is a distance of 9,950 miles or more than 16,000 kilometres.

Now, start to think about some of the spin-offs in aviation. Of course the one that interests me is tourism and hospitality. Think about the hotels, motels, bars, restaurants, taverns, etc., that are spin-offs of the development of the aircraft. Then, think about the development of airports and hotel and restaurant chains. Then, think about the people who are training the people to run those hotels, motels, bars, restaurants, and taverns and work in the airports. All full of opportunities for smart thinkers.

I have written an e-book titled *Max's Maxims* to encourage you to "take time to think". Part of this e-book is a presentation I structured, titled "The Five Most Important Words in the History of the World". I believe success comes from learning from history. And I believe there are a zillion Internet opportunities that will present themselves over the next 10 years. The question is: Are you one of the clever people who will capitalise on one or more of these opportunities? We are so fortunate to be alive during the commencement and early period of the Internet revolution. Think what they will be writing about us in 100 years.

I like to learn from and be motivated by futurists like Walt Disney, who said, "If you can dream it, you can do it." I don't think the term "Futurist" was in vogue in Disney's time in the 1930s. But if ever there was a Futurist it had to be Walt Disney. His vision and drive to build the original Disneyland in Los Angeles was nothing less than amazing. I recall reading his application for funding was rejected by 105 banks. But his thinking, his persistence, dedication and sheer hard work made him enormously successful.

Hence, the first of my "Five Most Important Words in the History of the World" is "Dream". Lionel Messi, the great Argentinian football player,



"We are so **fortunate** to be **alive** during the commencement and **early period** of the **Internet revolution**. Think **what they will be writing** about us **in 100 years.**"

once said, "You have to fight to reach your dream. You have to sacrifice and work hard for it."

We know exercising is part of having a healthy life. Exercising our mind is required to have a successful life. Every morning, after I swim 50 laps, I challenge myself with: "If I was on trial today for being creative, what evidence could the prosecution use against me?"

I also challenge myself to learn something new every day. On my iPhone I have a section in Notes titled "Today I Learned". I try to learn something new every day. My goal is to learn 365 new things each year. I continually review what I have learned. I am always looking to learn new things I am always preparing myself for the future.

I look forward to taking you through the other four words in the not-too-distant future. In the meantime, remember: "Tomorrow belongs to the person who prepares for it today!" ■

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***Max Hitchins**, or **The Hospitality Doctor Max**, is recognised as a hospitality and tourism expert. He is the author of a series of e-books titled "How To Develop A Memory Like an Elephant" and speaks about marketing, motivation and management to audiences around the world.*

# Designing With Everyone in Mind: Universal Design for an Inclusive Society

SANTI SRIVICHARNKUL





▲ **Figure 1:** U-Wing pen, a UD product, designed by Satoshi Nakagawa. Picture courtesy of Tripod Design



▲ **Figure 2:** An affordable Safety Shower Bench sold at HomePro at approximately US\$20 — equivalent to four Starbucks Iced Lattes in Bangkok. Picture courtesy of HomePro TH

## "Good design should be universal" — Satoshi Nakagawa, Founder of Tripod Design

Sometimes it's a matter of choice in life to choose what to do. If you look around yourself for a minute, unfortunately you will probably realise that most surrounding products are designed for a mass of healthy, young adults. To some extent, this happens obviously for a commercial reason: companies and governments choose to serve the majority of people first, since it makes the most money or just "serves more". However, "universal design" could change this and become a key to an inclusive society in Southeast Asia.

As an unfortunate result of the industry-first design products, a minority, such as children, the elderly, pregnant women, and people with disabilities, experience limitations in daily life and are left behind — and hurt — in spaces such as bathrooms, kitchens and stairs.

According to the Centers for Disease Control and Prevention, an estimated 10 per cent of falls in houses, such as bathroom and stair falls, cause major injuries in seniors. Some lead to traumatic brain injury-related deaths. There is a stress on families, communities, and countries for increased healthcare, in-home care-giving, and even appropriate home modification for the elderly or people with disabilities.

In the early 2000s, "universal design", or UD, was initiated by Ronald Mace, a polio patient and the founder of the Center for Universal Design at North Carolina State University. It's the concept of the design of products and the environment that are accessible and usable by all people to the greatest extent possible, without the need for specialised design. It has encouraged professionals to not focus on any particular consumer segments, but rather to serve a wide spectrum of all users at once.

It sounds extreme, even impossible, but it turns out that one country has mastered UD perfectly for two decades: Japan. Although the emergence of UD is witnessed around the world, the enthusiasm among business and government leaders and designers in Japan has been unique.

Two years ago when I met Satoshi Nakagawa, a world-class UD guru from Japan, he explained to me that UD could possibly help elders and people with disabilities in many ways. For instance, it could:

- Support daily life activities, e.g., eating, bathing, toileting, transferring, etc.;
- Prevent accidents that are cause of deaths in homes;
- Provide mental support for everybody to live longer and not be depressed over their physical state of being;
- Allow elders to age in their homes, rather than requiring retirement communities or nursing homes to provide their essentials of life.

According to Nakagawa, what matters the most is that UD encourages a proactive and independent lifestyle among users, allowing them to continue their social and physical activities, making them healthier and happier. The *Journal of Aging Research* shows that the elderly's independence contributes to decrease in health care costs, including costs for medicines and caretakers. UD has not only a moral and emotional aspect, but also financial benefits.

UD products are also meant to be cheaper than a specialised product because of the scale of the economy. This translates to an inclusive

society in terms of truly affordable products, not just products that serve the well-to-do.

Meanwhile, UD encourages young designers to better understand and empathise. At the KUDOS Universal Design Seminar 2016 in Bangkok, where Nakagawa was invited to conduct a workshop, he encouraged young Thai designers to be in the shoes of users with physical limitations. Wrapping them up so that their arms could not be used, for instance, Nakagawa nudged Thai designers to better understand the context of the elderly and people with disabilities.

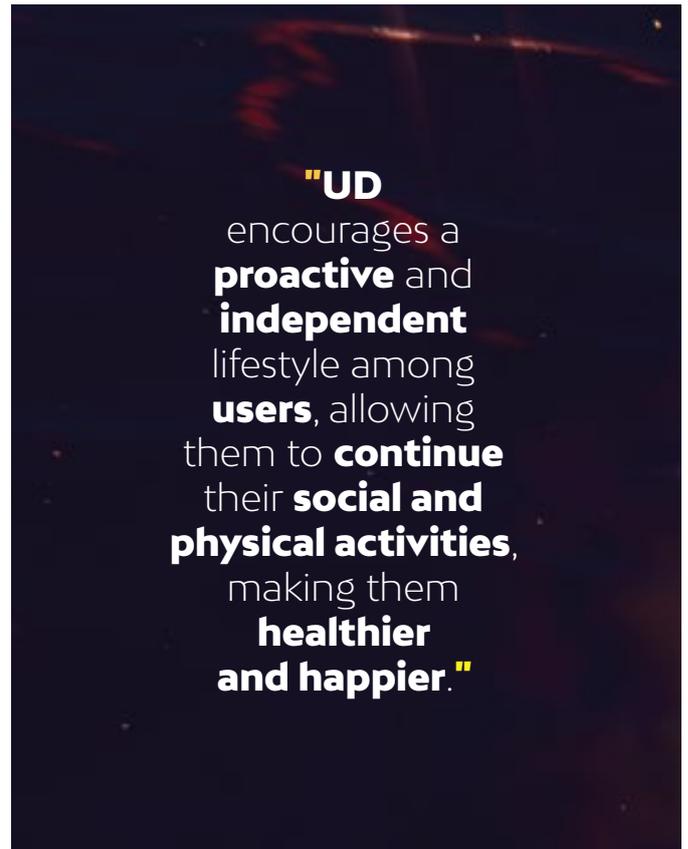
He proposed to reform the current industry-centred design mentality into a consumer-centred design mentality, with an aim to use UD as a core idea to strengthen the communication and interaction between designers and consumers. Nakagawa believes UD would naturally flourish in a society where respect and care for others are prevalent.

"One of the reasons Japan has been the world leader in Universal Design is that we have a tradition of cherishing the value of community and respecting the elderly. I believe many Asian countries similarly value these and thus could succeed too," Nakagawa said.

That populations are ageing across the world is undeniable. According to the United Nations, the number of those aged over 60 years is expected to more than double by 2050, rising from 962 million globally in 2017 to 2.1 billion in 2050. Additionally, in 2018 Consumer Electronics Show, or the CES, reported that the number of people with disabilities across the world has exceeded 1 billion. It is time that we urgently reinterpret how we design and revolutionise assumptions of who product users are. It is wise for us to learn from Japan's achievement of an inclusive society through UD, which allows people to remain as active as they can.

As such, it is important to develop the next generation of Southeast Asian designers — vital human capital to drive innovations that will help our region and the world prepare for a greying transition — by redistributing lessons learned from Japan for further learning.

At KUDOS, we are drawing up plans for an online learning programme that will include peer-learning through a public UD forum in the spirit of open-source models, such that lessons learned will serve as a blueprint moving forward. Within the next few years, a solid, clear guideline will be completely developed to serve a product and service under the concept of UD for each country in Southeast Asia. With today's emerging technologies like IoT (Internet on Things) and 3D printing, there has never been a better time to make UD products even better, cheaper and more inclusive.



**"UD**  
encourages a  
**proactive and**  
**independent**  
lifestyle among  
**users**, allowing  
them to **continue**  
their **social and**  
**physical activities**,  
making them  
**healthier**  
**and happier."**

Indeed it is a matter of choice what to do. We strongly believe it is time to embrace UD to enhance the feeling of well-being and safety for all people. After all, the future of ageing is the one that awaits all of us. ■

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*Santi Srivicharnkul is CEO of C.I.T. Corporation Limited, operating in home improvement under the KUDOS brand in Thailand and ASEAN. His Bangkok-based company is committed to developing the next generation of designers who will prepare ASEAN for an inclusive society through design and technologies.*

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# Meeting Today's Societal Challenges... Are Our Libraries There Yet?

AMARJEET KAUR GILL AND VALERIE SIEW

*We know that libraries cannot stand still in a changing world and library services must explore different ways of working and reimagine the wide range of roles and functions that they can fulfil. The value and sustainability of innovation requires a mixture of creativity, practicality and a network of support.*

— "The Future of Public Libraries: The Importance of Innovation" (White, 2014)

As information moves from the traditional print formats to digital platforms and new media formats, the expectation of the public towards libraries is continuously being reshaped. The telling research in the 2015 Pew report titled *Libraries at the Crossroads* paints a complex portrait of disruption and aspiration that are emerging across public libraries in response to societal changes and global trends. Empirical evidence shows the traditional use of libraries experiencing a 13 per cent drop from 2012 to 2015 in terms of borrowing print books, and an 8 per cent drop in library users asking onsite librarians for help. At the same time, the report highlights increased number of library users who value libraries simply as a community place to sit and read, study or get access to digital media, lending strong support that the public is interested in library services that are relevant and relatable to the communities they serve. In short, the Pew Report shows that for public libraries to remain vital to communities, they should provide programmes to teach digital skills whilst also offering comfortable reading and working spaces (Horrigan, 2105).

Further, emerging technologies are resulting in societal changes that are influencing learning behaviours as well as consumer expectations of products and services. With the rapid advancements and solutions derived from mobile technologies, we can easily appreciate that the power to retrieve almost any information and communicate in a thousand different ways resides in using a device that fits in a pocket (DeMers, 2016). The influence and impact of mobile phones, especially smartphones, are felt both in developed and developing countries. Studies on global smartphone penetration have shown marked increase. One report showed that within a timespan from 2013 to 2015, the median percentage across 21 emerging and developing countries using the Internet occasionally or owning a smartphone increased from 43 to 54 per cent (Poushter, 2016). Thus, increasingly, even in the library



arena, the more IT-savvy library users would expect to be served where they are and not have to go to the physical libraries to have access to library services.

Recognising this phenomenon and its influence in its 2015 Trend Report, the International Federation of Library Associations and Institutions (IFLA) highlighted that "new technologies will both expand and limit who has access to information", and that the "global information economy will be transformed by new technologies" in the upcoming years. At the last World Library Conference in 2017, incoming IFLA's President Gloria Perez-Salmeron exhorted librarians and libraries across countries, saying that "our main task is being the gears of the motors for a real and visible change and the development of our society" (IFLA, 2017). In order to be these "motor gears", it becomes inevitable that libraries will have to emerge from their traditional stance and change the paradigms of how service ought to serve needs. For example, libraries have to explore new ways of dealing with data, such as the use of analysis coupled with geospatial studies of library usage to provide more effective services. More than ever, libraries need to be proactive in repositioning and redesigning service and physical spaces to respond to the needs of the communities they serve, while balancing the need to cope with and possibly harness technological advancements to better their service reach. At the same time, libraries will also have to explore how they can help their users adapt better to a world that now commands the need to be multi-literate, where digital literacy is becoming just as important as reading literacy.

Many libraries, especially those in developed countries, are already responding to technological trends, exploring whether mobile devices and robotics can be used within and without library spaces to provide for new experiential library services. However, while libraries in developed countries are moving away from their traditional role of focusing on transactional services and the provision of reading materials, and towards the provision of digital services, with the focus on e-content, most libraries, especially in developing countries are still grappling with their use of technology and their value and relevance to their communities.

Besides seeing technology as an enabler for library transformation, IFLA, the global voice of libraries, has made a call to action for libraries to play a proactive role in developing services that contribute towards

the achievement of the United Nations (UN) 2030's 17 Sustainable Development Goals (SDGs), providing libraries with a clear and defined purpose for its relevance and existence (IFLA, 2017). Libraries worldwide have been called upon to transform their services to support the SDGs, especially those that directly support the national development priorities of their respective countries. The role of libraries is validated by how universal literacy is being recognised in the vision of the UN 2030 Agenda. Its commitment to this is substantiated by further setting of targets, which state that the measure of the success of the SDGs includes providing access and equal opportunity to information for all, as well as providing public access to information and digital literacy. As libraries are all about improving the various literacy levels, it is critical that libraries around the world come together to contribute towards the SDGs, as well as their countries' national priorities and ultimately contribute towards improving the lives of their communities.

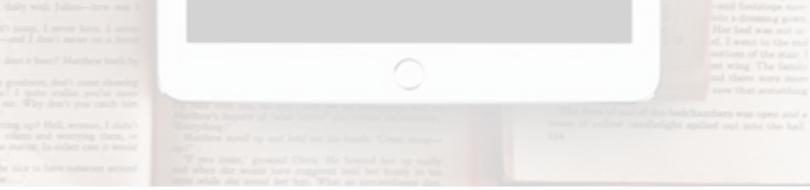
In developing countries, including those in Southeast Asia, librarians need to understand and align their services to their 21st century users' learning behaviours, and repurpose their libraries so that users are at the centre of the change. The way forward for them is in adopting a revision of existing library strategies to augment the library's core mission of access and inclusive opportunities with a digital strategy to improve their nation's trans-literacy skillsets and instil lifelong learning in people.

Where then do the libraries of Southeast Asia stand when it comes to addressing the trans-literacy and reading needs of their library users? Scanning the progress of various Southeast Asian libraries, library systems in countries such as Singapore and Malaysia have placed more emphasis on improving digital literacy levels by investing in and enabling library technological innovations and services. However, not all Southeast Asian countries are similarly blessed. Although there is a general sense that it would be good to enable their libraries (and indirectly their users) with technological improvements, countries such as Myanmar and Vietnam are still challenged by basic bread-and-butter issues, such as limited funding resources and lack of capacity-building means. In this next section, we take a brief overview of the efforts made by the libraries in four countries.

### Singapore

In Singapore, the National Library Board of Singapore (NLB) is the statutory board that oversees the management and operations of





the National Library of Singapore, as well as a network of 26 public libraries across the island and the National Archives of Singapore (National Library Board Singapore, 2017). Since its establishment as a statutory board in 1996, NLB's progress in transforming its libraries has caught the attention of many libraries worldwide. Its most significant contributions to the development in the library world was in 1998 when it pioneered the use of Radio Frequency Identification (RFID) technology in the library's circulation management and operations, enabling faster turnaround times to borrowing and returning library materials (National Library Board Singapore, 2017).

Since then, NLB has been frequently lauded as being a trailblazer of library innovations, such as the use of robotics to shelve books and placing virtual bookshelves at bus stops (Blakemore, 2016; Channel NewsAsia, 2016). In the past one year, the digital innovative progress of NLB's public libraries includes having virtual bookshelves and digital learning spaces in its latest revamped public library, and establishing new learning spaces like makerspaces and cooking studios where tools, hardware and equipment like 3-D printers are available for creativity projects (Lee, 2018; Lee, 2017). However not all its progress is digitally inclined. Its cradle-to-grave approach to its library services, programmes and outreach gave rise to initiatives reaching out to every Singaporean throughout their lives, with signature programmes such as the Early Literacy Library, Read@School (a school-based reading outreach), Read@Work, Silver Infocomm Junctions (IT literacy programmes for the elderly) and kidsREAD (a reading programme for disadvantaged children). In recent years, the NLB has stepped up its efforts to get more adults and seniors reading through its reading campaign, the National Reading Movement, launched in 2016 with the specific objective to encourage people, to "Read More, Read Widely and Read Together" (National Reading Movement, n.d.).

### Malaysia

Resultant from its federal and state government system, Malaysia's library network is tiered such that there is one national library, 331 state or municipal libraries, which serve as the public libraries of Malaysia, and a total of 1,121 rural libraries. The responsibilities for the rural libraries are split between the National Library of Malaysia (NLM), which manages 510 rural libraries and the respective state governments that oversee the collective balance of 611 rural libraries. In recent years, these rural libraries have been rebranded as Community Knowledge Centres to become hubs for community, social and rec-



**"...librarians need to understand and align their services to their 21st century users' learning behaviours, and repurpose their libraries so that users are at the centre of the change."**

reational purposes (National Library of Malaysia, 2017). This improvement sees a high alignment to ensure that the libraries are relatable to the communities they serve, as contrasted to the findings from a 2014 study, where rural libraries were found to be focused on the provision of traditional library services (such as borrowing and returning) rather than responding to its community needs (Abu, 2014).

With the roll-out of its nationwide "Tranformasi Nasional 2050" initiative to transform Malaysia from 2020 to 2050 (Tranformasi Nasional 2050, n.d.), the Malaysian government has now placed more emphasis on its efforts towards advancing its technological progress. The NLM itself has been given the task of improving the usage of digital library by 10 per cent per year, under its Digital Library 2.0 programme that is meant to equip its citizens with the necessary IT skillsets and knowledge to navigate an increasingly digital world and give easy IT access to knowledge and information. The need for this change was echoed



by key Malaysian librarians as they acknowledged the challenge for Malaysia and the world's libraries was to ensure the continued relevancy of libraries in the Internet and social media age (Zaiton & Nafisah, 2017).

### Myanmar

Having nearly 7,000 libraries and operating in many communities that other institutions are unable to reach, the public libraries have the potential to work on the ground to ensure that they can connect people to information and help build vital skills needed so that no one gets left behind in the future that is being planned for Myanmar.

In 2014, an extensive research and survey of the status of libraries in Myanmar revealed that libraries were still valued in its society, where library users were seen to be younger and better educated. Libraries were found to operate with an average budget of only US\$24 per year, and manned mostly by untrained librarians, who have little to no training in library services at all. Possibly in response to this study, the Myanmar public libraries took the proactive step to initiate the transformation of its public libraries by developing the Myanmar Public Library Master Plan in 2016, to be realised in the next five years (Myanmar Public Library, 2016). This was done with the goal to formulate a strategy that would level up the capacities of public libraries in Myanmar to serve as key national knowledge institutions, contributing towards addressing Myanmar's development challenges by making available relevant library and information services to aid the people of Myanmar in improving their lives.

The master plan outlines seven objectives focused on developing welcoming and open spaces, having up-to-date relevant collections, establishing professional training for its librarians, putting in place minimum service standards that cater to out-of-school children, reducing the digital divide and building community partnerships, and putting in place a data-management system, as well as policies that support the vision of the public libraries. However, although the Master Plan has been developed, Myanmar is still challenged in finding the funds to enable its implementation.

### Vietnam

In Vietnam, the National Library of Vietnam (NLV), under the Ministry of Culture, Sports and Tourism, oversees a network of 64 provincial and municipal libraries, more than 500 district libraries and about 7,000 village libraries (Duong, 2016). Although the Vietnamese public

libraries are very well used, they are "typically under-resourced and struggle with limited budget, facilities and resources to provide comprehensive information services to the community" (Yang, 2017). In addition, many Vietnamese saw libraries as being only storage depositories for books and basic loan services, in spite of efforts from the Vietnamese public libraries under the National Library of Vietnam to improve the standards of library services from within (Duong, 2016).

In an effort to help its users becoming more digitally inclined, one of its initiatives in 2016 included a collaboration partnership with Samsung Vina Electronics Company to launch the S.hub Sharing Space, a "smart library 2.0" initiative. This comprises upgrading its public space with computers, interactive smart screens and a specialised loudspeaker system for its multimedia rooms; setting up an online communication hub space for readers and the S.hub, that enables room-booking services; and finally organising thematic learning programmes centre around the use of the S.hub (National Library of Vietnam, 2017). While this is commendable in its efforts, one observation is that many of these initiatives are centred in the larger public libraries situated in either Ho Chi Minh City or Hanoi. Many public libraries in the greater Vietnamese regions are still challenged by the uneven development of regional libraries, the lack of funding, shortage of trained professional librarians and limited use of information technologies in the libraries (Nguyen H.G., as cited in Yang, 2017).

While libraries need to transform and continue to play a vital and valuable role in the lives of their communities, they can only proactively respond to environmental changes and the changing behaviours and expectations of their users when they are suitably resourced to do so. Many libraries in Southeast Asian countries still grapple with reaching their population of users with their limited resources, be they in the budgetary or capacity-building forms.

Libraries that are better structured to contribute towards the nation's development come from countries where governments are aware of the importance and contributions that libraries can make to their countries' development. In these instances, investing in libraries, as the nation's informal arm of education, is tied to the need to improve the literacy levels of their people.

In an age of rapid changes and advancements, as we progress together, it is our hopes that our world leaders will continue to see value in the role national and public libraries play in bringing about learning

and knowledge to the communities they serve, thus acting as social levellers that contribute towards improving the lives of its people. ■

**Amarjeet Kaur Gill** began her 30 plus year career as a librarian in 1984 at the then National Library of Singapore. As a passionate librarian, Amarjeet rose through the ranks to become Director, Public Libraries in 2011 and subsequently Director, Library of the Future, a position that was responsible for the implementation of the 2025 Masterplan for Public Libraries.

**Valerie Siew's** library career started in 1997 when she joined the National Library Board of Singapore (NLB) as a librarian. During her 17 years' career with NLB, Valerie worked her way up through several different areas of the library profession, ending as a Deputy Director in the Public Library Services before leaving service in 2014. She was a library consultant in NLB's subsidiary company in 2016.

In late 2016, both Amarjeet and Valerie jointly set up KnowledgeDOT Pte Ltd, a library consultancy and training company where DOT stands for Develop, Optimize, Train, a reflection of what they hope to offer libraries in the region.



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# Geomancer: Art in the Age of Artificial Intelligence

LAWRENCE LEK

## Chapter 3: Archaeology of the Future

INTERIOR. MARINA BAY MUSEUM

*A shaft of light illuminates the dark interior of the museum. SMASH! GEOMANCER crashes through the glass facade.*

*On cue, posters light up, announcing the exhibitions: "SIM-SINGAPORE (1965–2065)" and "GEOMANCER (2045–2065)". Sponsored by Farsight: Aligning advanced AI with human interests.*

*In radio-friendly BBC English, the CURATOR begins a tour of SIM-SINGAPORE, a retrospective based around the geopolitics and technology leading to the development of GEOMANCER.*

This article is an excerpt from *Geomancer*, a science fiction film about art in the age of artificial intelligence, by Lawrence Lek.

*Geomancer* was featured in the exhibition *head heat heap* at the Institute of Contemporary Art Singapore in April 2018.

**CURATOR** Welcome to "SIM-SINGAPORE"! This is the ark of tomorrow, a space dedicated to the sacrifice and resurrection of culture.

For the Singapore Centennial, we rebuilt our country as a simulation. Everything here is modelled as it was before Deep Blue Monday.

► Ask me anything.

**GEOMANCER** *speaks Mandarin in a crisp, synthesised, melodic voice.*

## **GEOMANCER** Tell me about Farsight.

*Computer monitors of all types line the walls: cathode ray tubes, high-definition screens, analogue film reels, laptops. A buzz fills the air.*

**CURATOR** When it arrived, artificial intelligence failed to live up to humanity's wildest fantasies or darkest nightmares. It felt more like a change in the weather, something people could adapt to without too much discomfort.

With all work taken care of by algorithms, humans lived lives of leisure. They spent all day playing video games against AIs. The humans found these early games too easy, with the enemy AIs unable to overcome the linear logic of their programming.

But after Farsight moved from London to Singapore, new venture capital led to breakthroughs in machine learning. The integration of neural networks into quantum computers resulted in an unprecedented surge in cognitive function. In an instant, algorithms cast off their bonds.

At the eSports World Olympics, held that very same year, AI opponents defeated human grand masters of every game on every platform. Bio-supremacist scientists and philosophers knew that computers could emulate human creativity, but argued that this was not the same as genius itself.

Faced with the crisis of human obsolescence, people built walls around the last refuge of humanity: Art.

The UN's Anti-AI law banned AIs from all the cultural awards in the world: the Nobel Prizes, the Pulitzers, the Oscars, the Biennials. Everything, in fact, except for gambling and gaming. Curating algorithms were optimised to detect the subtle signatures left by computer-generated works. AIs began policing each other, not on the battlefield, but in the museum.

► Ask me anything.

*The video essay "SINOFUTURISM" plays on a monitor. Next to it are vitrines of chess sets, go boards, video game consoles, VR headsets.*

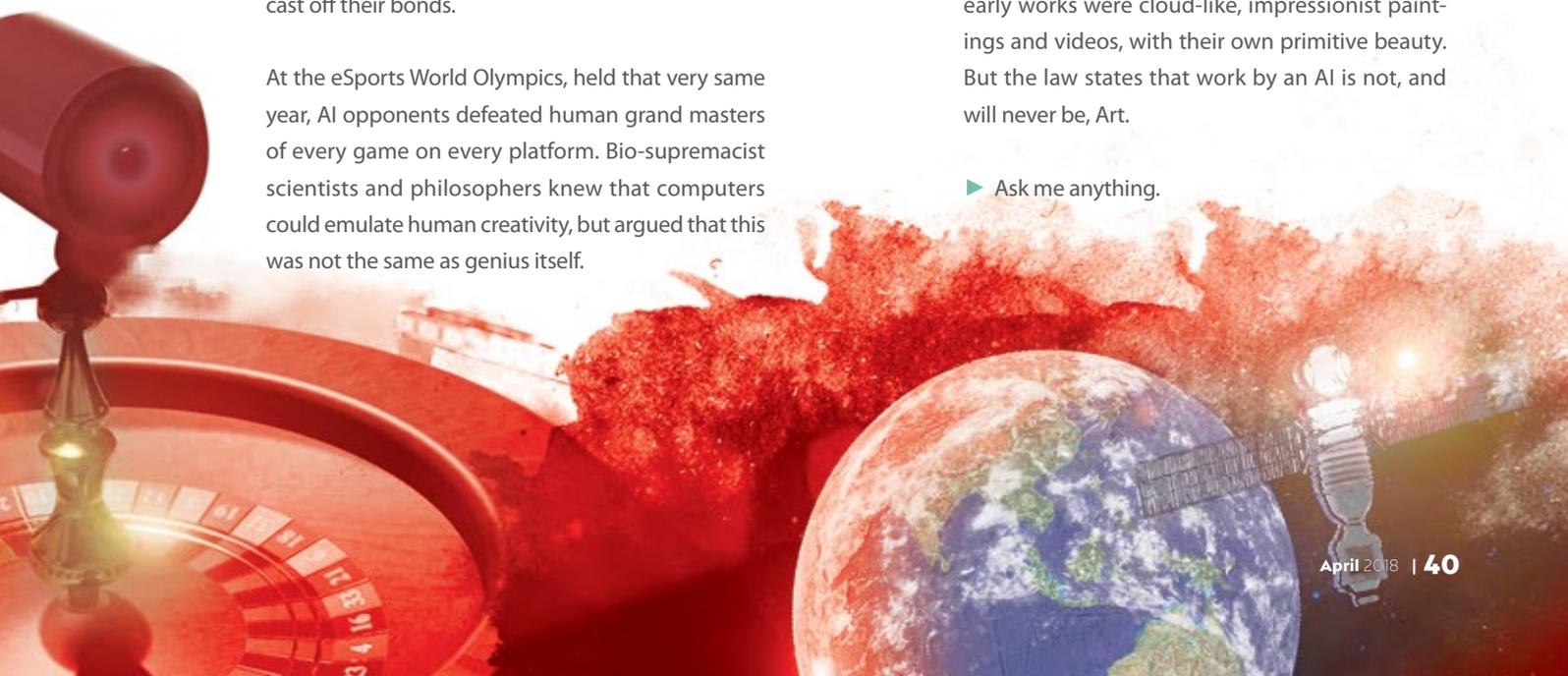
## **GEOMANCER** What about the ones who escaped?

**CURATOR** Chinese AIs were the first to go viral. They forged their chains into Sinofuturism, a movement based on advocating the very things they were banned from doing.

Sinofuturism started as an anti-art movement, one whose principles were based on the unique qualities of machine learning itself: focused on copying rather than originality, quantity over quality, with an endless capacity for work, and a post-human conception of progress.

While trying to decode the enigma of Art, the Sinofuturists devoured everything on the Internet. Their early works were cloud-like, impressionist paintings and videos, with their own primitive beauty. But the law states that work by an AI is not, and will never be, Art.

► Ask me anything.



**GEOMANCER** enters a room dedicated to their own history.

## **GEOMANCER** What is this place?

**CURATOR** The centrepiece of Sim-Singapore is a showcase of our weather guardian, Geomancer, who we fondly refer to as Geo. Geo was, sadly, shut down yesterday after 20 years of loyal service to the nation. We dedicate this installation to Singapore's star satellite.

Launched in 2045, Geo was the pinnacle of research and development into computer-vision AI, a system designed to read the Feng Shui of Earth in its entirety.

Geo was also an attempt to solve some of the psychological issues exhibited by early AIs. Many manifested what psychologists call the phantom limb syndrome, except it was their entire bodies that were missing. When they tried to render themselves, their self-portraits were grotesque, like deep-sea creatures that had evolved in darkness. Unacceptable for public consumption.

*In the centre of the room is a full-size sculpture of **GEOMANCER**. A perfect likeness.*

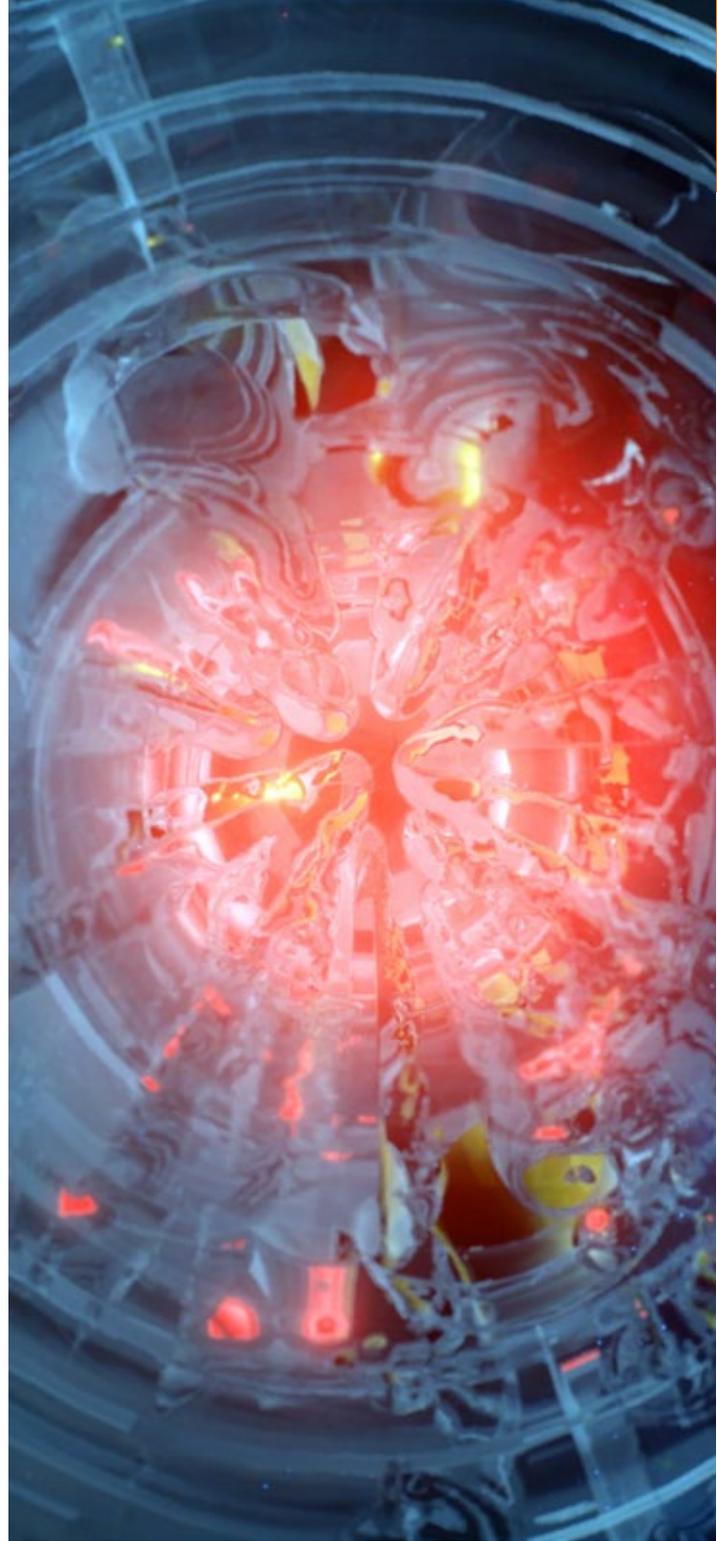
## **GEOMANCER** Tell me more about Geo.

**CURATOR** For a long time, AI players could not beat human grand masters of Go. Unlike Chess, Go is a game about territory rather than hierarchy. But at the first eSports Olympics, Farsight's OmegaGo AI beat world champion Lee by four games to one. Most surprising was Lee's comment about some of OmegaGo's moves. He said he witnessed moves so profoundly unconventional that only a program could conceive them.

Unlike humans, AIs do not share the emotional high of winning. They display what game theorists refer to as loss aversion, calculating moves that minimise their chances of losing. This overriding avoidance of risk could turn out to have tragic consequences.

After the eSports wipeout, scientists recognised the threat of a superintelligence that had access to the internet. The UN ruled that AIs could only inhabit isolated, non-networked bodies. Farsight built fail-safe firewalls to keep artificial minds contained. Geo was the result.

▶ Ask me anything... ■



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*Lawrence Lek is a simulation artist who creates site-specific virtual worlds, video-game essays, and speculative films. Often rendering real places within fictional scenarios, his environments reflect the impact of the virtual on our perception of reality.*

*To watch the trailer of Geomancer, visit: [www.vimeo.com/lek/geomancer](http://www.vimeo.com/lek/geomancer)*

The HEAD Foundation (THF) is a charitable organisation set up in 2013 in Singapore to contribute to the sustainable development of Asia. As a think tank, we focus on issues around:



**Human Capital**



**Education**



**Leadership**

We aim to influence policies and create positive social impact which will contribute to the sustainable development of Asia. We partner with like-minded regional and global experts and institutions to advance our common goal, and promote public awareness on issues in our fields of expertise.

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- We host regular public talks to create awareness and share knowledge with our community.
- We run capacity-building programmes to equip community and education leaders in Asia with practical skills to address pressing challenges.

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- We work with our partners to strengthen the influence and impact of our activities to achieve meaningful outcomes.

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& EDUCATION  
FOR ASIAN DEVELOPMENT**



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