

數位國家·創新經濟

## 智慧科技 美好生活體驗

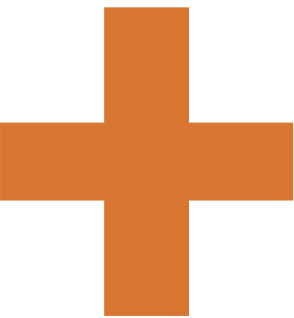
Smart technology enables an enriched life

唐鳳 從教育到產業應用 全面開啟創新數位新未來  
Digital Innovation from Education to Industrial Application

童子賢 讓臺灣成為新興科技的最佳實驗場域  
Make Taiwan the best place to experiment new technologies

【國際瞭望】AI、5G、8K—2020年東京奧運實現數位想像  
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## 編者的話

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# 科技會報辦公室 執行秘書 蔡志宏

## Zse-Hong Tsai, Executive Secretary of the Office of Science and Technology



人工智慧時代來臨，物聯網技術、機器人、無人商店、VR 與 AR 等帶來創新體驗，科技的進步不僅顛覆我們對生活的想像，更衝擊通訊產業、製造業、電子產業、半導體產業等各行各業。臺灣面臨新的挑戰，如何憑藉過去在人才、晶片、半導體的優勢基礎，積極轉型為以資訊應用豐富生活體驗的數位強國？

本期季刊從智慧科技帶來的生活體驗出發，看見臺灣優勢，探索未來的成功關鍵，我們可以從各領域代表的觀察與建言中，看見對數位國家的想像；也可以從新創公司的努力中看見新技術、新未來。

### AI 人才培育成為關鍵

政務委員唐鳳認為，現今人工智慧是人類經驗的延伸，當數位轉型迫在眉睫，成就未來的關鍵在於人才培育。因此政府積極將數位科技融入十二年國教新課綱，期盼從基礎教育出發、延伸到高等教育、產業應用，積極搭建創新實驗的平臺，讓新的技術與機會可以在臺灣生根。

無論是巨量資料分析，或者是人工智慧的科技創新，重點都在協助找出待解問題，進而分析最有效的解決之道，改善我們的生活。

In the era of artificial intelligence (AI), Internet of Things (IoT), robotics, cashier-less stores, VR and AR are bringing us innovative experiences like never before. The advances in technology are not only transforming our imagination of living but also affecting every aspect of society across the board—communications, manufacturing, electronics, semiconductor industries have all felt the winds of change. Faced with new challenges, how can Taiwan leverage its strong foundation armed with talent and know-hows in chips and semiconductor manufacturing, and transform herself into a next-gen digital powerhouse that can tap into information-rich applications to enrich the lives of her people?

In this quarterly edition, we set out from the enriched life experiences brought by smart technology to explore the advantages of Taiwan and focus on the key to success in the future. We paint a picture of a digital nation by drawing from the observations and suggestions made by leaders in various fields. We also catch a glimpse of what the future holds by learning what startups are doing.

### Fostering AI talent is the key

Minister without Portfolio Audrey Tang believes that today's AI is akin to an extension of human experience; digital transformation is imperative, and the key to the future lies in fostering talent! To this end, the government is actively

# DIGI+

中研院研究員暨台灣人工智慧學校陳昇璋執行長觀察到當企業想要進一步導入人工智慧技術時，往往會因為「缺乏實戰人才」、「資料基礎建設不足」、「不易找出正確問題」以及「產學之間的鴻溝」等因素而裹足不前，為了幫助企業再創新局，人才的培育成為當務之急。

而一路走來，臺灣憑藉著虛實整合、技術領先的數位優勢，不只培養了無數未來科技數位人才，在產業創新應用方面，也持續保持充沛的動能。

## 新興科技創新帶動 轉型升級

隨著物聯網技術發達，人工智慧在各行各業的創新應用不斷，身為 DIGI+ 民諮會召集人童子賢董事長深信，未來人工智慧將成為硬體升級的力量，是臺灣科技業的轉型新契機。他也建議政府應積極在國內鼓勵發展智慧城市的各項創新應用，不僅讓新科技帶來豐富的生活體驗，更期盼未來讓臺灣成為新興科技的最佳實驗場域。

從提供軟體產品轉為服務導向的微軟，因為聚焦雲端服務、發展人工智慧而成功轉型；今年初更宣布在臺成立微軟 AI 研發中心，兩年內投資臺幣十億元成立百人規模研發團隊。因為看見許多中小企業在數位轉型創新服務時所面臨的挑戰，微軟大中華區人工智慧負責人趙質忠也建議企業，數位轉型不僅是軟體導入，而應該重新檢視需求，因為真正的人工智慧應該是從日常生活出發，改善生活與工作的品質與效率。

integrating digital technology into the new 12-year national education curriculum, in hopes of starting them young from basic education, all the way to higher education and actual applications in the workplace. By engaging in the creation of platforms for innovative and experimental programs, the government is working toward allowing new technologies and opportunities to take root in Taiwan.

Whether it is big data analytics or AI innovations, the focus is on helping us identify problems and analyzing the most effective solutions to ultimately improve our lives. Sheng-Wei Chen, academician at Academia Sinica and CEO of the AI Academy, noted that when companies want to take the next step in introducing AI technology into their business, they are often held up by obstacles such as "lack of experienced talent", "insufficient digital infrastructure", "difficulties in pinpointing the real problems" and "the great divide between academia and industry". Therefore, fostering talent is a top priority in opening up new avenues for enterprises.

Over the years, Taiwan has been cultivating countless talents in future technology by integrating the best of the virtual and real worlds while maintaining a digital edge, all of which are continuing Taiwan's momentum in industrial innovation and applications.

## Emerging technology innovations drive transformation and upgrades

With the rise of IoT, AI applications can be found in various domains. Tsu-Hsien Tung, convener of the DIGI+ Civil Advisory Committee, is convinced that future AI will be the force pushing forward hardware upgrades, and it presents a new opportunity for transforming the tech



## 5G 新時代， VR、AR 體驗新未來

為了追求人類生活的進步，長期關注如何讓半導體幫助人類展現原有自然智慧的鈺創科技盧超群董事長也分享，隨著晶圓製程微縮、晶片堆疊技術創新，異質化整合技術讓半導體產品有愈來愈多元的創新應用，包括發展汽車先進駕駛輔助系統、推動精準醫療等，而這些未來想像都要靠第五代無線通訊技術（5G）來實現，幫助 AI 終端晶片的技術得以突破。

隨著 5G 即將在 2020 年商用化，速度更快、無所不在的通訊技術，將進一步推動科技的創新，為你我的生活帶來更豐富的新體驗。

尤其是傳輸速度較既有 4G 快上數十倍的 5G，將加速虛擬實境（VR）與擴增實境（AR）技術的普及，許多包括房屋、傢俱、汽車、教育、旅遊等產業都有更多元的創新運用。

industry in Taiwan. Tung also suggested that the government should prioritize the development of innovative applications for smart cities in Taiwan—new technology can bring about new living experience and Taiwan can become the best testbed for emerging technologies in the future.

From a software products provider to a service-oriented solution provider, Microsoft has successfully transformed itself by focusing on cloud services and the development of artificial intelligence. Earlier this year, Microsoft announced the establishment of an AI R&D Center in Taiwan, with plans to invest NT\$ 1 billion to form a 100-person R&D team in two years. Witnessing firsthand the challenges faced by small and medium enterprises (SMEs) in the process of digital transformation and offering innovative services, Jason Tsao, Head of Artificial Intelligence at Microsoft Greater China, advised businesses to reexamine the real demands in play because digital transformation is more than just introducing software but improving life or work quality and productivity—true AI begins with real life.

## Ushering into the new 5G era—experience the future with VR and AR



為了因應不斷擴大的市場需求，專注空間溝通的 iStaging 愛實境堅持投入 AR、VR 技術的創新，鎖定產業龍頭，讓資源最大化，打造更豐富的實境體驗。還有以大數據技術輕鬆觸及跨螢消費者的 Appier 沛星互動科技，幫助企業建立使用者資料建立行為資料庫，幫助企業在顧客與營運方面，洞燭機先。

展望未來，政府將持續落實 DIGI+ 方案，透過鬆綁法令、投資數位基礎建設、強化跨域數位人才培育，讓大數據、物聯網和人工智慧等科技應用技術，為台灣社會帶來更創新更美好的生活體驗。

In pursuit of the quality of life, Nicky Lu, Chairman of Etron Technology Inc., has long been an advocate of making the best of semiconductors to help humans showcase our natural intelligence. Lu pointed out that with innovative advances in wafer scaling and 3D ICs, heterogeneous integration is leading the way to more diverse and novel applications of semiconductor products, including the development of advanced automotive driver assistance systems and the promotion of precision medicine. These visions of the future rely on 5G, the fifth-generation wireless communication technology, to support the breakthrough in edge AI.

As 5G expects commercial use in 2020, a faster and ubiquitous connected world is slated to further accelerate the innovation of technology and add incredible new experiences to our lives.

Since 5G is at least 10 times faster than the existing 4G, it will further increase the popularity of virtual reality (VR) and augmented reality (AR) technologies. Innovative applications can range from home and furniture to automobile, education and tourism industries.

In response to the ever-expanding market demand with a focus on offering immersive space experience (e.g., AR and VR), iStaging has targeted market leaders to maximize its resources in creating enhanced real-world experiences. Meanwhile, Appier, a technology company that easily reaches out to its cross-screen customers through its big data technology, helps businesses build audience behavioral database to seize opportunities by understanding the inner workings of customers and operations.

Looking forward to the future, the government is keen on pushing the DIGI+ Program. Through relaxing laws and regulations, active investment in digital infrastructure, and strengthening the cultivation of cross-domain digital talent, technology applications such as big data, IoT and AI are going to shape innovations and enrich our life experiences.

# 從教育到產業應用 全面開啟創新數位新未來

## Digital Innovation from Education to Industrial Application



數位轉型迫在眉睫，臺灣除了積極在教育端將數位科技融入十二年國教新課綱，政府更積極為產業搭建一個創新實驗的平臺，讓新的技術與機會可以在臺灣生根。

Digital transformation is an imminent issue. The Taiwanese government is seeking to address it by incorporating digital technology into the curriculum of its 12-year compulsory education system and creating an innovative platform where new technologies and opportunities can be experimented and take root in Taiwan.

面對劇烈變動的時代，大部分的領域不斷在重組、整併，現今許多已知的職業或工作，未來可能都已不存在。而當科技顛覆世界，社群網路崛起、人工智慧帶來的創新，改變了下一代看世界的角度，也全面顛覆對教育的想像。

所以，即將上路的十二年國教新課綱一改過去重視能力導向的教育方式，在知識學習外，更強調素養能力的養成，強調「自發」的學習，不再透過分組、分科，讓人才分流；到了高中端，更導入原先大學才有的選修制度，讓孩子透過跨領域課程的探索，從生活出發培養發掘問題、解決問題的能力。

We live in an era of drastic changes. The majority of industries are constantly reorganizing and merging, and many of the professions or jobs known to us today may no longer exist in the future. While technology revolutionizes people's lifestyles, rise of social network and artificial intelligence is changing the ways our next generations perceive the world and ultimately alters our imagination on education.

This is why the new 12-year curriculum has been designed in such a way that it is different from the old ability-based approach. It emphasizes more on character building and "self-motivated learning" in addition to knowledge teaching. Students will no longer be diverted into different divisions or subjects. Instead, they will be able to take electives in senior high schools, a choice that was only available in universities. This

## 新科技為教育帶來新變革

「我們希望鼓勵孩子思考，這個世界沒有標準答案，當你想要讓世界變得更好，新科技就是幫助你的工具，讓你達成社會使命與人生目標。」政務委員唐鳳笑說。

未來的學習不再侷限於科目，而是打破框架，帶領孩子從真實的生活情境中，去感受、探索、批判、思考，進而關懷周遭的環境；而科技是他們最好的學習工具，尤其是在把寬頻視為人權的臺灣，無論是偏鄉或離島都有寬頻；再加上 4G 的普及，科技完全顛覆孩子的學習，讓他們不再是課堂上被動的接收者。

他強調：「教育的目的是讓孩子充分了解，無論未來世界變得如何複雜，每個人都是參與者、擁有改變的力量。」同時培養孩子自發的關懷，願意與人合作。

為了因應教育變革，在大學端也正研擬修正有關大學的「學位授予法」，讓學位不再只是由單一學系提供，以跨領域的方式學習有興趣的相關知識。當世界趨勢不斷變化，光是四年的大學教育未必能因應需求，終身學習也將成為趨勢。



change allows students to develop their problem-identification and problem-solving abilities through exposure to interdisciplinary courses.

## New technologies bring new changes to education

"We encourage students to think because there is no single correct answer to most problems in the world. If you want to make the world a better place, new technologies are your tools. They help you accomplish your missions and purpose desired in life," said Audrey Tang, Minister without Portfolio of the Executive Yuan.

In the future, learning will no longer be confined to specific subjects. Students will be encouraged to think outside the box, and be guided to feel, explore, criticize and think in real-life scenarios so that they know how to care for the environment they live in. Technology will be their best learning tool, especially in Taiwan where access to broadband has been perceived a basic human right and is available in remote areas or offshore islands. Moreover, with the prevalence of 4G, the way students learn has been fundamentally revolutionized by technology. The students are no longer passive receivers of knowledge like the ones they used to be.

Tang emphasized, "The purpose of education is to make students understand that, no matter how complicated the world becomes, they are all part of this world and wield the power to change it." Education also aims to motivate the students to care for others and work with others.

To accommodate the educational reform, the government is also exploring the possibilities of amending the "Degree Conferral Law" in tertiary education so that degrees will no longer be awarded by a single department. This would encourage students to learn skills and knowledge that interest them in different fields. In a world that is constantly changing, four years of tertiary education will no longer be adequate for students. This is why life-long learning has become a new trend.



「現在行政院正在推動的社會創新行動方案中，其實高等教育扮演了非常重要的角色，我們試辦了為期兩、三年的USR，也就是大學社會責任計畫，讓大學的能量能與社會脈動密切結合。」唐鳳指出，USR就是為了幫助學生貼近社會的需求，從做中學，累積經驗；同時讓大學學程的設計能即時回應社會需求，與社會共生。

## 以開源模式建立共享共好，擴大影響力

在教育變革之外，自從維基百科社群大鳴大放，打破了既有規則，建立起共同編輯、共享資訊的模式，帶動起開放資料風起雲湧；同時，開源軟體也成為驅動科技創新的力量，讓許多新科技、新機會得以自由展開。

唐鳳分享，「所以當前我們也積極建立開放的政府，包括邀請大家一起討論參與式預算，連政策及法律都可以因應時代的變遷而修正、調整。」這些都奠基於自由開放的公民社會之上，讓更具開創性、開放的、開源社群的觀念更加普及，從人才培育延伸到產業創新，全面擴大影響層面。

一路走來，臺灣憑藉著虛實整合、技術領先的數位優勢，不只培養了無數未來科技數位人才，在產業創新應用方面，也持續保持充沛的動能。

"Tertiary education plays a vital role in the Executive Yuan's Social Innovation Action Plan. We have begun a 2 to 3-year trial-run of University Social Responsibility (USR) program to make the universities' capacity more closely connected with social trends." Audrey Tang pointed out that USR is intended to bring students close to the needs of the society and encourage the students to learn and accumulate experience through practice. Meanwhile, university programs are being redesigned to reflect the society's needs and facilitate co-prosperity with the society.

## Open source and sharing for bigger influence

In addition to educational reform, the rise of Wikipedia has broken old rules. Coediting and information sharing have driven the openness of information. Open source software has also become the power that drives innovation, allowing many new technologies and opportunities to be unfolded freely.

Audrey Tang said, "This is why we are actively forming an open government administration by inviting the public to discuss budgets, policies and laws so that the budgets, policies and laws can be amended and adjusted to accommodate changes in time." All of the above ideas are possible only in a liberal and open society, where original and open thinking is appreciated. The prevalence of openness will influence all walks of life, from talent cultivation to industrial innovation.

以人們生活緊密相連的數位金融發展為例，正因為臺灣各地寬頻建設普及，加上人人都有行動載具，因此提供了數位金融很好的發展環境，許多的創新的營運模式也開始遍地開花，例如虛擬通貨、共享經濟等。

唐鳳指出，「雖然金融業在臺灣受到高度規範，但為了鼓勵創新，政府單位也積極為產業找解方。」為此經濟部推出「創新法規沙盒平臺」，透過法規鬆綁的倡議打造更友善、更彈性的創新發展空間；還有國發會成立新創法規調適平臺窗口，以及「金融監理沙盒（Regulatory Sandbox）」，幫助創業者有更多實驗創新的機會，在錯誤中累積經驗、降低社會成本，蓄積成功的能量。

數位科技顛覆世界，「現今人與人工智慧發展的過程愈來愈密切，形成共生的關係，可說是人們智慧的延伸。科技幫助人們省下更多時間與流程，讓人們能關注周遭的事物、擁抱不同的生命經驗，同時思考如何讓生活變得更好。」

唐鳳也深信，科技時代下永續與共好的概念讓人們在追求物質之外，重新思考生命的價值，看見幸福。



Over the years, Taiwan has nurtured countless digital talent with its advantage in hardware/software integration and digital environment, and the industries have been active in the application of industrial innovations.

Take the development of digital banking, a service that is closely related to people's life, for example, because of the extensive broadband coverage and prevalence of mobile apps, Taiwan has been a good environment for digital banking. Many innovative business models, such as virtual currency and sharing economy, have thrived on this development as a result.

Audrey Tang said, "Although the financial industry is highly regulated in Taiwan, the government has been actively exploring solutions for the industry in order to encourage innovation." One of the solutions is the "Innovative Regulatory Sandbox" introduced by the Ministry of Economic Affairs. Through relaxed regulations, the government hopes to create a more friendly and flexible environment for innovation. Other solutions such as the New Regulation Adjustment Platform and the "Financial Regulatory Sandbox" proposed by the National Development Council have also been introduced to start-ups for experimenting new ideas. They allow the start-ups to learn from mistakes at lower social costs, while accumulating experience for future success.

Digital technology has revolutionized the world. "The development of human and AI has become closer and closer. The symbiosis relationship between human and AI has rendered AI an extension of human intelligence. Technology helps people save more time and process so that people can direct their attention to things around them, embrace different experiences, while thinking how to make life better."

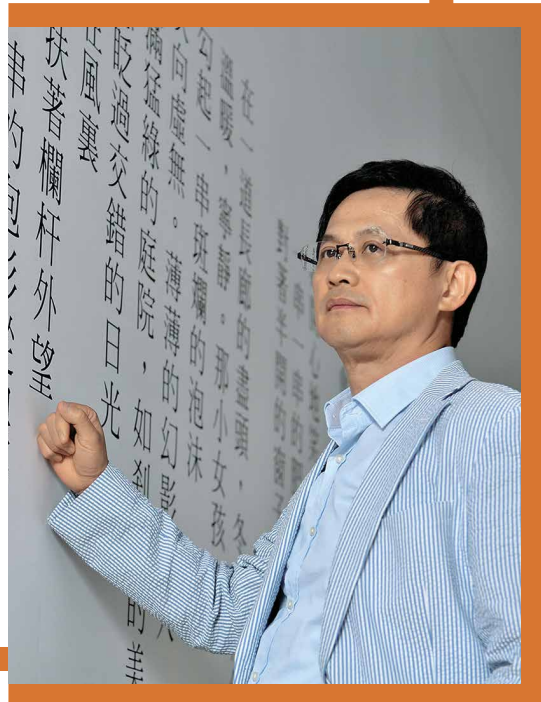
Audrey Tang also believes that, in the era of technology, the concept of sustainability and mutual prosperity allows people to rethink the value of life and see happiness apart from pursuing material satisfaction.

# 讓臺灣成為新興科技的最佳實驗場域

## Making Taiwan the best place to experiment new technologies

「面對新科技，與其阻擋，不如善用。」每年製造上億臺智慧型手機，和碩是全球智慧型手機組裝產業前五名，身為DIGI+ 民諮會召集人的和碩董事長童子賢很有感。

"We should put new technologies to good use, rather than resisting them," said T.H. Tung, convener of DIGI+ Civil Advisory Committee and Chairman of Pegatron Corporation, one of the world's top five smartphone assemblers with production of more than 100 million smartphones each year.



過去十年來，他用 iPhone 收發電子郵件，用 iPad 讀資料、下載了即時通訊軟體跟遠在美國的女兒溝通。現在，他的工廠用人工智慧檢測、家裡有時下最流行的智慧音箱，觀察人工智慧對生活的影響，他說：「我們的生活型態、對社群的依賴度，已經深遠地被科技給改變了，」

## 製造業轉型軌跡： 從自動化到人工智慧製造

時代在變，製造業因應時代轉型的腳步從未停歇，和碩早在十八年前就開始導入自動化生產，在機械手臂、智慧光學檢測等先進設備的協助下，和碩位於蘇州的工廠，同一單位的生產速度較以往增加六至七倍。

For the last 10 years, Tung used iPhone to send and receive e-mails, read on iPad and chatted with his daughter in the U.S with real-time communication software. Today, he uses AI for factory tests and enjoys the latest smart speakers at home. Having observed how AI has affected people's lifestyle, he said, "Technology has profoundly changed the ways we live and connect with the society."

## Transformation of the manufacturing industry: from automation to AI

Time has changed, and the manufacturing industry has never ceased to keep up with time. Pegatron Corporation began introducing automated production 18 years ago. With the help of advanced equipment, such as robotic arms and optical inspection, Pegatron managed to increase production speed per unit of production by 6 to 7 times at its Suzhou Factory.

但這還不夠。智慧生產、物聯網加上人工智慧，工業 4.0 將更升級。「人工智慧對製造業的幫助，就像是過去耕耘機為傳統農業帶來革命性的突破，」童子賢說，過去，和碩廠內的機械電子電路組裝不良品分析，得用十幾個人、花上兩週的時間。但是和碩事先花了三個月的時間，用過去的數據資料訓練人工智慧分析系統，真正上線檢測，只用幾個小時就完成了。

談到人工智慧在各行各業的應用，童子賢認為人工智慧適合針對單一議題、在龐大資料中進行深度推演。他打趣說，AI 不能當央行總裁，但是可以擔任央行總裁助理，因為人工智慧可以快速分析匯率漲跌、分析對社會整體進出口影響。美國華爾街就是看中人工智慧可快速完成閱讀、分析的工作，正在大批大批地解僱初級營業員與分析師，快速轉型為科技服務業。

## 臺灣可以成為新興科技的實驗場域

過去，臺灣常常被批評「只會做硬體、沒有軟實力」，但童子賢認為，人工智慧將成為硬體升級的力量，是臺灣科技業的轉型契機。他主張臺灣應該把自己當成新科技的實驗場域，先在國內發展智慧城市，吸引國外城市來臺取經。

比如：人口密度高的停車場中往往一位難求，如果在停車場內安裝感測裝置，做到車位控制、車牌辨識、自動收費系統，這就是智慧城市的一環。停車場是都市中的舊基礎，物聯網中大幅採用的感測裝置也是臺灣資通訊產業擅長的項目，只要願意重新把資訊管理再進化，就是新的藍海商機。

However, this is still not enough, because smart production, Internet of Things (IoT) and AI will bring about a more advanced upgrade, or Industry 4.0. "What AI brings to the manufacturing industry is similar to what cultivators did to traditional farming - a revolutionary breakthrough," said T.H. Tung. In the past, it took Pegatron more than a dozen people and two weeks to complete defective assembly analysis. To address this shortcoming, Pegatron spent 3 months training an AI-based analysis system using historical data. When the system went live, it took only few hours to complete the analysis.

When asked about industrial applications of AI, T.H. Tung believed that AI is very suitable for performing a single task in great depth amidst an enormous volume of data. He said that AI can not become the Governor of the Central Bank, but is useful as an assistant of the Central Bank Governor owing to its ability to quickly analyze exchange rate changes and impacts on overall import and export. Wall Street firms are currently looking to exploit AI for its fast data capture and analytic abilities, and are laying off junior traders and analysts wave after wave to pave the way for their transformation into technology-based service.

## Taiwan can be an experimental ground for new technologies

Taiwan used to be criticized for "only having the hands for hardware but no minds for software"; however, T.H. Tung sees AI as a means to upgrade hardware capacity, and therefore presents transformation opportunities for Taiwan's high-tech industry. He argues that Taiwan should treat itself as an experimental ground for new technologies, and start building smart cities to attract foreigners to learn from Taiwan.



一旦臺灣出現了世界一流的智慧城市典範，就有整廠輸出的機會。童子賢透露，明年的智慧城市展已確定有一百五十個城市首長親自到訪，正是臺灣展現人工智慧、科技實力的最佳時機。

## 打破舊思維、迎接新契機

「沒有產官學合作，智慧城市的推動將窒礙難行。」童子賢感嘆說，如果法規無法鬆綁，許多創新科技窒礙難行。譬如無人車要普及一定要進行道路實驗，有些智慧住宅瓦斯、水、電都是自動控管，這也都牽扯到公領域，沒有地方政府一起加入合作，專業廠商只能待在實驗室裡頭，無法將新技術新應用普及到我們的生活。

在世界各地，創新科技帶來的衝擊無所不在，在紐約，已經看不見人們在街頭攔計程車，而是透過手機使用共享汽車服務。在中國鄉間的簡陋小吃店裡，攤商卻能夠透過一張塊

For example, parking lots tend to be scarce in densely populated cities. By placing sensors in carparks, we can control parking lots, identify license plates and achieve automatic fee collection, which is one step towards building a smart city. While carparks are old infrastructure in any city, the sensors used for IoT are one thing that Taiwan is good at producing. As long as we are willing to take steps to improve information management, we will be able to create a blue ocean full of opportunities.

Once Taiwan establishes its global reputation for building smart cities, opportunities to export turnkey solutions will soon emerge. T.H. Tung revealed that mayors from 150 cities worldwide will be visiting next year's smart city exhibition, and this would be the perfect time for Taiwan to demonstrate its AI and technological capabilities.

## Ditch the old thinking and embrace the new

"Without collaboration between the industry, the government and the academia, it becomes very difficult to realize our visions toward smart

破損的 QR CODE 條碼用支付寶收款。童子賢坦言，在臺灣推廣新科技應用，最大痛點是心態守舊。

「如果我們不去做，臺灣的產業就不會進步，工程師沒有新的體驗，怎麼設計服務？」童子賢說，不僅智慧城市，在行動支付、共享經濟... 只要是開創性的新科技，都會對既有產業帶來一定的衝擊，如 UBER 衝擊了計程車產業、第三方支付衝擊了金融業，但這些衝擊能帶來前進的動能。

身為 DIGI+ 民諮會召集人，童子賢認為國際之間的競賽是動態的，不能只靠單一面向思考，政策制定者、推動者和商戰浪尖上搏鬥的企業家們應該一起精準合作，產官學研搭橋齊聚，針對臺灣的數位經濟政策提出更全方位的建言。正因為轉變帶來衝擊，才需政策循循善誘，幫助既有的產業安然轉型、度過危機，讓社會能夠迅速而無痛地銜接到創新領域，是他對智慧國家政策最深遠的期許。



city," said T.H. Tung. He then mentioned several examples where innovative technologies are being strangled by old laws. Self-driving vehicles, for instance, requires road test to evolve, while some ideas about smart home involve automated control of gas, water and electricity that can only work with the help of the public sector. Without participation of the local governments, inventions can only exist in laboratories and will have no chance of becoming a part of our life.

Innovative technologies are changing people's lives all over the world. In New York, people no longer fight for taxi on roadside. Instead, they call for car-sharing service using cellphones. Meanwhile, a run-down food stall operating in a remote area in China manages to collect payment via Alipay with the help of a damaged QR CODE. T.H. Tung admitted that the biggest obstacle for promoting new technology in Taiwan is people's old way of thinking.

"If we don't try, there will be no improvement to Taiwan's industries. If our engineers have no experience in the new technology, how do we expect them to design services based on it?" T.H. Tung pointed out that any ground-breaking technology, be it smart city, mobile payment or sharing economy, will inevitably impact existing industries to a certain extent, like what UBER did to taxis and what third-party payment did to the financial industry. However, these are the impacts that will move us forward.

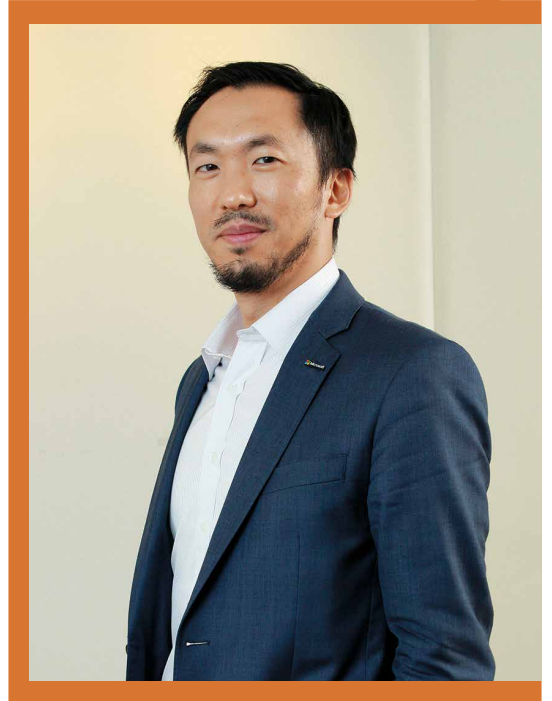
As the convener of DIGI+ Civil Advisory Committee, T.H. Tung considers international competition a dynamic process that can not be addressed by any single sector. Instead, the policymakers, the inventors and businesses should collaborate with each other to develop more comprehensive yet fine-tuned strategies for Taiwan's digital economy. It is because of the potential impacts from changes that we need government policies to guide existing industries through their transformation and crisis so that the society may connect quickly and painlessly with innovations. This is the level of involvement that Tung expects from the country with regards to smart policies.

# 整合數據基本功 人工智慧幫助企業迎向世界

## Digital technology and AI help win the world over

告別 Windows 時代，微軟這頭步履蹣跚的大象近幾年「瘦身」成功，從賣軟體產品轉為提供服務，聚焦雲端服務、人工智慧，股價重新再登高峰。說微軟是最懂如何數位轉型的科技企業，應不為過。

Microsoft, the slow-pacing elephant, has recently been successful at detaching from its reliance on Windows and reorganizing towards a service provider, as opposed to a software seller. By focusing on cloud services and AI, the tech giant once again saw its share price rise to historical high. It is not an overstatement to describe Microsoft as the tech company that knows best about digital transformation.



甫在今年一月宣布在臺成立微軟 AI 研發中心，兩年內投資臺幣十億元成立百人規模研發團隊，微軟大中華區人工智慧負責人趙質忠有感而發地說，「數位轉型並不單單只是採購哪一套軟體這麼簡單，而是真的以數位化的角度思考企業未來，如何讓內部更有效率地運作、以新的方法跟客戶接觸，才能產生全新的商業模式。」

趙質忠現今也協助許多外部客戶進行數位轉型，「比較尷尬的是仍有一定獲利能力，但優勢逐漸消失的中段班。」他發現，不管是大公司或中小企業，臺灣企業主的焦慮感相

Furthermore, in January this year, Microsoft announced its establishment of AI Research Center here in Taiwan and investment of NT\$1 billion into building a research team of more than a hundred members within two years. Jason Tsao, head of Microsoft's AI team in the Greater China region, said, "Digital transformation involves more than just choosing the right software to purchase but requires more in-depth thinking about a company's future from a digital perspective, including ways to operate more efficiently, new ways of reaching customers and new business models."

Jason Tsao currently helps many customers adopt digital transformation. "Most of those in need of adopting this change are enterprises

當明顯。因為，中小企業受限於規模不大、成本持續墊高、人才持續凋零，而大型企業尤其製造業者則面臨中國崛起、生產基地再一次轉移的抉擇。

## 人工智慧不是萬靈丹 應先做好數據整合基本功

現今企業主對新科技的接受度都很高，但如何扣緊實際需求，讓數位科技在企業裡頭落地生根，則是困難所在。

趙質忠指出，臺灣企業主經常過度期待人工智慧，視之為萬靈丹。印象最深刻的一次，一位製造業企業主對他說：「只要你保證導入 AI 後，機臺再也不會出問題，我馬上就簽約，」讓他哭笑不得，現階段的人工智慧有極限，只能分析曾經發生過的事情，予以解決。

他也務實地建議，企業主更應該思考「我要人工智慧做什麼？」人工智慧的先決條件是要有數據，他深入了解許多有意願導入人工智慧的公司，但工廠裡頭機器跟機器之間的數據是不相通的，集團裡子公司與子公司之間的資訊也不相通。此時，他通常會直接了當的說：「現階段你不需要 AI，你應該先做數據整合。」

以扣件大廠世德工業為例，雖然憑藉老師傅精湛的手藝成為一方霸主，但由於手工製造難以達到高階扣件產品瑕疵 0ppm 的客戶要求，在轉型製造航太、汽車等產業使用的高階扣件道路上，始終困難重重。微軟與財團法人金屬工業中心合作，協助世德工業一步一步將人工智慧導入產線。最基本的就是將產線上的機臺互相連線，再來，從產線上的

that may still be making profits but are losing the competitive edge," he said. Tsao felt this anxiety across business owners in Taiwan, from large corporations to SMEs. SMEs in general face challenges of operating at limited scale, rising cost and retiring key personnel; large corporations, especially manufacturers, are presented with the need to relocate production sites again in order to compete against Chinese firms.

## AI is not a panacea solution and requires extensive digital integration

Business owners nowadays are highly receptive of new technologies, but the challenge lies in finding their actual needs and building the right advantage with digital technology that would help them thrive.

Jason Tsao pointed out that Taiwanese business owners often have unrealistic expectations about AI and see it as a panacea solution. The owner of a manufacturing business once said to Tsao, "I would sign right now if you can assure that AI will rid my machines of all problems..." which he found quite difficult to respond to. There are only very limited things that AI can do at this stage of development; the technology can only analyze what had happened and attempt to solve the problem.

He recommends business owners to think practically about "What is it that I want AI to do for me?" The prerequisite condition for adopting AI is adequate volume of data. He has looked deep into many companies that showed willingness to incorporate AI into their operations, only to find that data is not connected between machines within the same factory or between subsidiaries under the same group. At this point, he would usually tell his customers, "Right now you don't need AI, what you should begin with is data integration."



不良品自動檢測，到系統產線瑕疵預警、甚至讓老師傅換產線的經驗都能數位化。最後，讓世德工業的生產效率提高三倍，精密螺釘精確度也提升 50%。

他也以微軟自身實際導入業界的方案為例說明，或許大家很難想像到目前為止，人工智慧滲透率最高的產品竟是辦公室生產力軟體 Office。當你在行事曆主旨輸入「中飯」時，人工智慧小秘書會自動把時間設定為中午十二點。也會檢查你的會議時段安排，給出最適合的建議，讓你能有更完整的時間處理需要專注的公務。甚至，貼心提醒你：「發送郵件的對象通常晚上十一點以後就不會再讀郵件了，是否明早再寄出呢？」

趙質忠認為，真正的人工智慧應該是無所不在地從各種細微事物中，改善生活或工作的品質與效率，而非在短期間推出出革命性產品。

SUMEEKO, a large manufacturer of industrial fasteners, for example, has proven able to build an empire from the fine craftsmanship of its seasoned workers, but there is only so much that manual process can achieve, and it is very difficult to keep defects within 0ppm as many customers may require for high-end fasteners. This is why SUMEEKO has struggled making its transformation into high-end fasteners for aviation or automobile industries. In collaboration with the Metal Industries Research and Development Centre, Microsoft began helping SUMEEKO incorporate AI into its production line step-by-step. The most fundamental change made was to connect machines across production lines. Next, the team made digital implementation of various processes, including automated defective product testing, production line alert, and workers' experience on production line switch. Ultimately, SUMEEKO managed to increase production efficiency by 300% and improve the precision of screws produced by 50%.

Based on real solutions implemented by Microsoft, Tsao said that most people would be surprised to know that Microsoft Office, the office productivity software package, is actually the most popular AI solution adopted to date. When you input "Lunch" into the subject field of your calendar, the AI Assistant will automatically set time at 12:00 noon. The AI Assistant also checks your meeting schedules and recommends the most suitable arrangement so that you have more time to tend to work that require your attention. The AI Assistant would even remind you, "The recipient seldom checks e-mail after 11:00pm. Do you wish to postpone sending until tomorrow morning?"

To Jason Tsao, the true benefit of AI is to improve quality and efficiency of life or work in every little detail, and not to introduce revolutionary products within short period of time.

## 軟體人才是優勢 彈性與開放幫助企業走出去

當前臺灣人才在中文智慧輸入、使用者意圖分析以及 AI 產業垂直整合三大領域中，展現無與倫比的優勢，讓微軟人工智慧研發中心的表現相當亮眼。趙質忠也直言，每個國家都有自己的定位，對於臺灣建構數位國家的計畫，他最期許政府給企業的資源就是「法規鬆綁」。

他以東歐小國愛沙尼亞為例，愛沙尼亞政府是全世界最數位化的官方組織，打造完整而透明的數據基礎建設，讓創業者可以在彈丸之地盡情測試服務，進而推向全球市場，造就新創企業人均比全球最高的紀錄。去年，愛沙尼亞更創全球先例，要用加密貨幣發行國債，臺灣身為海島型市場，值得向愛沙尼亞政府的靈活身段取經。

「想要培養出獨角獸企業，臺灣的公司一定要走出去，」因為愈開放的市場，愈能造就空前性的成功，趙質忠眼神堅定地說道。



## Software talent, flexibility and freedom are crucial

Taiwanese talents have so far demonstrated unmatched advantage in terms of intelligent Chinese input, user intent analysis and vertical AI integration, which contributed to the outstanding accomplishments of Microsoft's AI Research Center. Jason Tsao said that every country has its own position in the world, and he considers "deregulation" the best resource the government can provide for businesses towards building a digital nation.

He used Estonia, a small country in Eastern Europe, as an example and said that the Estonian government is the most digitally transformed government in the world. Estonia has complete and transparent digital infrastructure in place for business entrepreneurs to test their services before introducing them to the rest of the world, and therefore has the highest percentage of new business entrepreneurs in the world. Last year, Estonia became the first country in the world that issues national bonds denominated in cryptocurrency. Taiwan, as an island market, has much to learn from the flexibility of the Estonian government.

"Taiwanese companies must embrace the world if they wish to become unicorn enterprises because only within a true open market may businesses achieve the ultimate success", said Jason Tsao with resolve.

# 以 5G 擁抱新科技 定律時代

## Embracing the new post-Moore's Law era with 5G

全球人工智慧浪潮蓬勃發展，建構從雲端運算到數位匯流更有效率的工具與環境是核心議題。在這波浪潮中，鈺創科技創立 28 年來所研發生產的 IC 產品一直是全球半導體業的關注焦點，尤其近年積極落實的「三經合流」是成就關鍵。

Waves of artificial intelligence are sweeping across the globe. Creating more efficient tools and environments founded upon cloud computing and digital convergence is at the very core of this game. Riding this wave is Etron Technology, whose IC products have been important players in the global semiconductor industry for 28 years since its inception. Its ingenious "eye-brain-nerve convergence" initiative is the driving force behind its more recent success.



談起所謂三經合流，是由三個感官神經所組合而成的半導體相關展品，第一經是腦神經，鈺創的利基型緩衝記憶體就如同人類的大腦，掌管記憶（Memory）；第二經是視覺神經（Vision），鈺創發展網路攝影 IC，也發展出 3D 視覺圖像。

盧超群董事長指出：「物件是立體的，人類視覺不該停留在 2D 圖像，因此我們在 2 年前就已經發表了 3D 視覺技術。」後來，蘋果的 iPhone X 也開發出臉部辨識系統讓 3D 圖像受到舉世關注。

The so-called "eye-brain-nerve convergence" refers to producing semiconductor products that combine the three crucial sensory nerve functions analogous to those of a human body. The first is Memory (the brain nerves): Etron's specialty buffer memory acts like a human brain in charge of memories. The second is Vision (the eye nerves): Etron has developed an array of webcam controller ICs and 3D imaging solutions.

"Real-life objects are three-dimensional, so visual presentation to the human eye should be more than just 2D images. That's why we already launched state-of-the-art 3D vision technology 2 years ago," Chairman Lu pointed out. Later on, the facial recognition from Apple's iPhone X brought 3D image sensors to worldwide attention.

第三經則是指神經傳輸（Connectivity），鈺創的 USB3.1 主端產品如同人體神經系統，負責傳達內容，速度亦有技術突破。

## 異質整合時代來臨

看見未來趨勢，盧超群首先談到半導體協助人類將原有的自然智慧可以被展現出來，例如臺灣與日本都在發展 AI 智慧安全帽，藉由內建攝影鏡頭，幫助人們做出更精準的行車判讀，半導體產品亦可以幫助盲人看得見東西，這些都是人工智慧增加人類自然智慧的最佳例證。

回顧過往，人工智慧發展源自於數學邏輯系統的進步，「半導體則可協助這些進步轉換為實際使用，」盧超群指出，可見人工智慧要靠半導體產品技術突破來支撐其發展。由過去摩爾定律的演進，促使半導體晶圓製程一直微縮，晶片堆疊技術也不斷革新，如今有人預言摩爾定律將在 2025 年結束，盧超群卻認為將走向類摩爾定律與指數型經濟成長。

摩爾定律是在積體電路上不斷擺進電晶體，使其功能爆發，盧超群認為未來在晶圓微小化同時，還將以異質性晶粒排列，搭配封裝堆疊技術創新，將不同的材質元件擺進電晶體，如微小化的攝影鏡頭，進而擴充功能。技術突破下，他也預言：「異質性整合時代來臨，邁向 1 奈米亦指日可待。」

隨著異質化整合技術的發展，半導體產品將可介入愈來愈多元的數位匯流範疇，例如鈺創在 2017 年打進日本汽車大廠的先進駕駛輔助 ADAS 系統，也與日本筑波大學附屬醫院合作肝臟腫瘤手術，透過 3D 相機建立肝臟模型與血管分布，就像肝臟的 GPS，「可透過 3D 視覺去除不相干影像，清楚檢視到每

The third is Connectivity (neural transmission): with technological breakthroughs in speed, Etron's USB3.1 host controller is like the human nervous system responsible for transmitting information at lightning speed.

## All hail the era of heterogeneous integration

Seeing the future trends, Lu talks about how semiconductors are helping humans exhibit our natural intelligence. For example, Taiwan and Japan are both developing AI smart helmets, which use built-in cameras to help riders make more accurate decisions on the road. Semiconductor products can also help the vision-impaired see the world. These are prime examples of artificial intelligence working to complement human intelligence.

In retrospect, the development of AI stems from the advancement of mathematical logic. "Semiconductors can allow these advances to turn into practical applications," Lu noted. Ultimately, AI relies on breakthroughs in semiconductor technology to support its development. In the past, Moore's Law has governed the chip scaling progress; meanwhile, chip stacking technology is gaining speed. It is predicted that Moore's law will end by 2025, but Lu believes that we will move toward a world of virtual Moore's Law and exponential economic growth.

Moore's Law is the evolution of continuously putting transistors into the integrated circuit to boost its capacity. Lu argues that in the future, while downscaling will continue, wafer miniaturization for heterogeneous integration and innovative packaging and stacking technologies will see different material components being put into the transistors, such as a miniature camera lens, to expand the functions. Under these new technological breakthroughs, Lu predicts that: "we've entered the era of heterogeneous integration and 1nm may be just around the corner."

一顆在血管上突變的腫瘤，幫助醫生在下刀前做出最好判斷。」

以本質來看，盧超群認為這正是在幫助人類的生活進步，他設想若累積大量的 3D 影像資料，將可協助醫療體系建構出不同類別的腫瘤雲，再藉由持續的視覺、傳輸、記憶，建立一個資訊完整的醫療資料庫，發揮半導體的社會功能，協助落實精準醫療目標。

## 新科技定律，5G 來實現

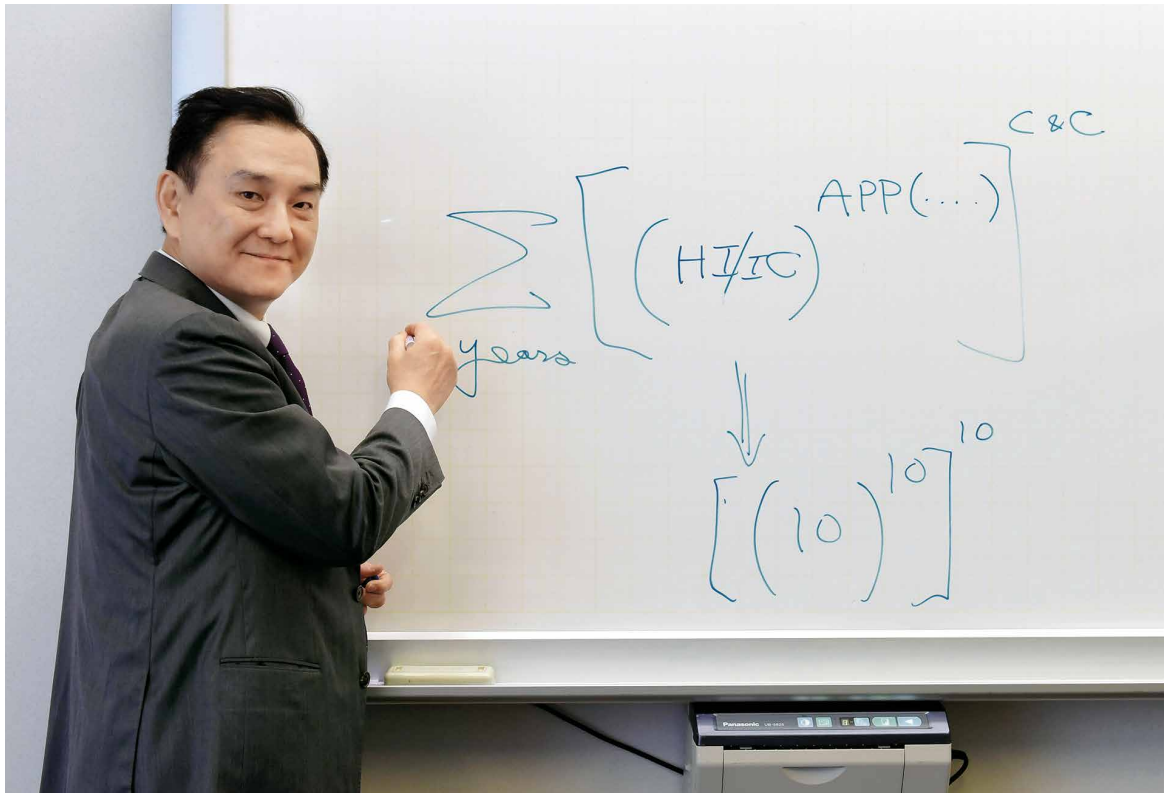
在告別摩爾定律之前，盧超群提出了新科技定律：

$$\sum \left[ \left( \frac{HI}{IC} \right)^{\text{App}(\dots)} \right]^{C\&C}$$

這項新科技定律的意涵是，半導體乘上不同 App 系統次方，再乘上兩個 C 加起來的次方，第一個 C 是 Content（內容），第二個 C 是

With the possibilities of heterogeneous integration, semiconductor products will be able to secure increasing engagement in digital convergence. For instance, Etron made its presence known with forays into the advanced driver-assisted system (ADAS) of Japanese automotive heavyweights in 2017. It has also been collaborating with the University of Tsukuba Hospital in Japan to develop a system for liver tumor surgery. The use of 3D cameras creates a liver model and a map of blood vessel distribution, serving like a GPS navigation system to the liver. The 3D vision allows the removal of irrelevant images to clearly make visible every tumor site on the blood vessels, assisting doctors to make the best decisions before any incision.

In essence, Lu thinks all of this is helping human life to progress. He envisions that a plethora of 3D image data will help hospitals construct different types of tumor clouds. Then, with the support of eye-brain-nerve convergence, a comprehensive medical database can be built, realizing the social functions of semiconductors to unlock precision medicine for the better.





### 5G, the essential catalyst for the new technology law

Before bidding farewell to Moore's Law, Lu has proposed a new technology law:

$$\sum \left[ \text{(HI/IC) App (...)} \right]^{C\&C}$$

The implication of this new technology law is that semiconductors are multiplied by the power of different app systems, and then multiplied by the power of the two Cs combined—the first C is content and the second C is cloud. This means when content is continuously transmitted to the cloud, this development structure enables a smart economy.

The global market for chips in terms of revenue is around US\$420 billion a year. In the next six years, this figure is expected to hit US\$660 billion. Lu is optimistic that, under this new technology law, the global chip revenue is expected to reach the 1 trillion benchmark, and its future is limitless.

These imaginations of the future are all based on 5G. Taking a step back to talk about the implementation, Lu said that "5G is a must-have tool for a connected world and cutting-edge AI chips need 5G to see breakthroughs. It is therefore imperative to develop 5G."

Taiwan's extraordinary advancement in the semiconductor industry over the years has been propelled by pioneering engineers' desire for technological breakthroughs since the early days. Lu calls on the young generation of engineers to continue this legacy and carry their passion for R&D in our digital nation, while striving to move Taiwan forward with emerging technologies, allowing artificial intelligence and digital convergence to complement each other and guide us towards a better future.

Cloud（雲端），也就是內容不斷傳送到雲端，在如此發展結構下，將可達到智慧經濟。

若以預估數字來看，現在全球晶片營收是4,200億美元，未來6年將增加至6,600億美元，而盧超群樂觀的認為在新科技定律支持下，全球晶片營收將可望突破1萬億美元，發展無可限量。

而回歸執行面，這些未來的想像都端賴5G來實現，盧超群笑說：「5G是工具，是傳輸的必備條件，AI終端晶片才得以技術突破，發展5G絕對刻不容緩。」

反觀過去臺灣半導體產業的突飛猛進，動力來自臺灣早期工程師們對技術突破的慾望，盧超群也期望年輕世代的工程師能在數位國家的帶領下，持續保有這股研發的熱情，共同追求臺灣新興科技進步，讓人工智慧與數位匯流激迸出更多創新火花。

# 從做中學， AI 人才培育不能等

AI talent training presents urgency

人工智慧技術正以超乎你想像的速度改變世界，面對這一波變革，是迅速崛起、還是灰飛煙滅？端看人才掌握度。

AI is changing the world at a pace beyond imagination. Will businesses rise above or sink under this wave of changes? It all depends on access to talent.



「數位科技一直扮演著『加速器』的角色，讓企業、國家可以更效率的分配資源、快速反應市場現況，人工智慧也不例外。」中研院研究員暨台灣人工智慧學校執行長陳昇璋面帶微笑地解釋，無論是巨量資料分析、或者是人工智慧等數位科技，重點都在協助找到問題，分析最有效的解決之道，因此，無論是個人、企業、學校、或者是政府都可以透過人工智慧技術取得先機、改善現況，再創新局。

## 臺灣優勢出發 以人工智慧再創巔峰

有別於其他數位科技，人工智慧不是單獨存在的技術，是「強上加強」的最佳方案，換

"Digital technology has always played the role of an "accelerant," enabling businesses and government agencies to distribute resources at higher efficiency and react more quickly to market conditions. AI is no exception." Sheng-Wei Chen, researcher of Academia Sinica and CEO of Taiwan AI Academy, explained that regardless of the type of digital technology sought, be it big data analysis or AI, the main purpose is to help businesses identify problems and analyze for the most effective solutions. Individuals, businesses, schools or even government institutions can all gain insight through AI, which enables them to improve the current conditions and create new opportunities.

## Gaining new grounds through AI

Unlike other digital technologies, AI does not exist in isolation, but instead builds on top of

言之，透過人工智慧技術，企業將能夠如虎添翼般的精進服務能量。「在人工智慧的加持下，製造、醫療、食農等臺灣企業將能夠加速創新轉型的腳步，以智慧製造、智慧醫療與智慧食農之姿，再度在世界的舞台發光發熱。」不過，陳昇瑋也指出，人工智慧是推動臺灣企業創新轉型的關鍵，但需要足夠的人才加入其中、激發無限可能。

而這也是台灣人工智慧學校的成立宗旨，目標透過產學合作，密集培訓人工智慧人才，尤其擔任技術、管理的種子角色，透過人工智慧技術協助臺灣企業解決智慧化轉型所面臨的挑戰。

「我們的目標是讓各個產業專家快速掌握人工智慧技術，每年培養 5,000 位人工智慧工程師與經理人。然後，憑藉著這些專家對產業的掌握度，幫助人工智慧釋放潛能，發揮最大綜效。」陳昇瑋進一步指出，許多臺灣企業已經意識到人工智慧的重要性，但是，當企業想要進一步導入人工智慧技術時，往往會因為「缺乏實戰人才」、「資料基礎建設不足」、「不易找出正確問題」以及「產學之間的鴻溝」等四個因素而裹足不前。為此，台灣人工智慧學校積極投入教學，加快臺灣企業 AI 化的速度。

one's existing strengths. In other words, AI allows businesses to refine and multiply their existing service capacity. "With the help of AI, Taiwanese businesses from manufacturing, medicine to agriculture will all be able to innovate and transform at a faster pace, and become model examples of smart manufacturing, smart medicine and smart agriculture to the rest of the world." However, Sheng-Wei Chen also pointed out that although AI is a key to innovation and transformation of Taiwanese businesses, it requires sufficient talent to inspire the promised potentials.

This is exactly the reason why Taiwan AI Academy was founded: to train AI talent through collaboration between the industry and the academia, especially the technical and managerial roles. The AI talent will eventually help Taiwanese businesses solve various challenges they face during transformation.

"We aim to help industry experts adopt AI within the shortest time possible, and have set goals to deliver AI training to 5,000 engineers and managers each year. These experts with their deep insight in various industries will help unleash the potential of AI and maximize synergy." Sheng-Wei Chen further pointed out that many Taiwanese businesses have realized the importance of AI, but when companies try to actually incorporate AI into daily operations, they are often deterred by challenges such as "lack of talent with practical experience," "lack of data infrastructure," "difficulty in finding the exact problems," and "the gap between reality and theory." Taiwan AI Academy recognizes the above challenges and is actively investing teaching resources to speed up implementation of AI across Taiwanese businesses.



## 創新點子 快速打造臺灣 AI 人才網絡

有別於一般的教學模式，台灣人工智慧學校以解決「企業面臨到的真實問題」為出發點，循序透過以下四個創新方式培育符合業界需求的人才。

首先，以大班制打造社群平台。有別於一般外訓課程是以小班制為號召，台灣人工智慧學校開設的「技術領袖培訓班」及「經理人週末研修班」，平均一班 200 人，一個班級就是一個社群，班與班之間有許多機會互動，將這些產業專家鏈結在共通的人工智慧社群平台上，發揮綜效。

其次，斥資千萬採購搭載 GPU 的運算資源，提供 9 間上課、研究的實驗室以及交流區，讓學員可以輕鬆體驗最佳人工智慧技術。第三則是將「臺灣企業面臨的真實問題」做為課堂題目，讓學員在不斷解題的過程中學習、

## Building AI talent network with innovation

Unlike the usual teaching model, Taiwan AI Academy begins by addressing "real problems encountered by businesses," and adopts the four innovative approaches below to train talent that the industry truly needs.

The first step involves creating a social network platform with a large group. Unlike other training institutions that deliver training in small groups, Taiwan AI Academy's "Technology Leader Course" and "Managers' Weekend Workshop" average 200 students per class. Each class represents a social network, and there are many opportunities for classes to interact with each other. By connecting a vast number of industry experts on a common social network platform, they each contribute to the development of AI knowledge.

The next step involves procuring computing resources with built-in GPU in the NT\$10-million range. These resources are allocated in nine classrooms, laboratories and common areas to give the students the best experience of AI technology. The third step is to make "actual problems faced by Taiwanese businesses" a real discussion topic, and inspire students to learn, practice and accumulate experience through the problem-solving process. In doing so, every student will be ready to apply AI in real situations upon course completion.

The final step involves "actual problem solving" and helping Taiwanese businesses develop customized industry upgrade solutions. Businesses are invited to send 3 to 5 employees to participate in the Technology Leader Course, where the employees explain to students the challenges that they are in desperate need to solve. These employees engage the students in a series of intensive problem-solving 3 days a week for a total of 16 weeks, and the ultimate goal is to

深化技術與經驗，讓每一位畢業學員都擁有人工智慧即戰力。

最後則是透過「移地解題」方式，為臺灣企業量身打造產業升級方案。由企業推派 3 到 5 名員工，帶著亟需解決的難題、營運痛點，參加技術領袖班，以每週三天的密集訓練與解題強度進行 16 週培訓，協助企業導入人工智慧技術、解決難題。依照產業現況做即時調整，加速培育可以接軌產業、躍升世界舞台的人工智慧大軍，推升競爭力。

## 專注擴大優勢 藉此極大化資源效益

「培育人工智慧人才不簡單，但更難的是，持續不斷的培養。在這個過程中，各個單位都應該專注在關鍵業務上，才能夠發揮最大綜效。」陳昇瑋表示，人才培育雖然可由產業主導，但對於資源有限又想透過人工智慧加速創新的中小企業來說，最欠缺的是可共享使用的 GPU 運算資源，而這便是未來政府單位可以著力的地方。

其次，不妨把資源挹注在最關鍵的人工智慧晶片研發，大幅提升臺灣在人工智慧領域的基礎能量，讓臺灣產業擁有引領市場變革的話語權。在此同時，陳昇瑋也呼籲在產學合作上，積極開放讓學校教授有機會到產業任職，讓產學可以進行更深刻的對話、激盪，極大化產學合作的效益。

陳昇瑋指出，「資源有限，不可能每一樣事情都要做、還都能做得很好，因此，『專注』成為我們的武器，無論是政府、法人、學校、產業都應該專注核心，然後透過合作聯盟擴大優勢，讓臺灣可以在人工智慧時代輕鬆勝出。」

help the business resolve difficulties by adopting AI. The training courses can be flexibly adjusted to accommodate the current industry condition. They have the potential of training AI talent in large numbers within relatively short time and helping industries develop competitiveness that would ensure their success in the world.

## Constant expansion of advantage to maximize resource yield

"It is not easy to nurture AI talent, but what's more difficult is training on an ongoing basis. In this process, everyone should focus on the most critical business activities to maximize results." Sheng-Wei Chen said that although talent training can be led by the industry, it is common to see many SMEs having the ambition to innovate through AI but lacking the GPU computing resources to realize such a vision. Providing shared resources is something that government agencies can do to help balance the scale.

He added that resources are perhaps best spent on developing AI chips, the most critical element of all. Accomplishment in this area would significantly improve Taiwan's AI development, giving Taiwanese businesses the game-changing advantage to define the future of their industries. Meanwhile, Sheng-Wei Chen recommends that the current industry-academia collaboration be expanded in such a way that it enables university professors to take employment positions at private businesses so that the industry may engage the academia in more in-depth communication and brainstorming for maximum benefits.

Lastly, Sheng-Wei Chen made the closing remark, "We all have limited resources. It is impossible for us to do everything in perfection. We must be able to focus, whether we are a government agency, a company or a school, the entire industry must focus and try to develop advantage through strategic alliance so that Taiwan may come out ahead in the AI race."

# 精準掌握消費者行為，以人工智慧助臺灣企業提升競爭力

Precise monitoring of consumer behavior and improving competitiveness of Taiwanese businesses through AI

空中換引擎、活人換心臟，聽起來匪夷所思，卻貼切的點出人工智慧對產業的迫切影響。當前，有63%的臺灣企業期望能透過人工智慧「預測客戶行為的精準度」，以加速企業轉型與提升競爭力。

Changing engines in mid-air and changing hearts for living people may sound outrageous, but they highlight the imminent impact of AI to current industries. Currently, 63% of Taiwanese businesses are looking to speed up transformation and improve competitiveness by leveraging AI's ability to increase "the precision of customer behavior forecasting."



「面對這一場全球盛事，臺灣的速度要更快，才能夠享受人工智慧帶來的效益，並且掌握改變世界的關鍵力。」Appier 東南亞、台灣與香港業務副總林柏翰表示，雖然臺灣企業普遍認同人工智慧技術帶來的成效，但在採用速度方面，卻顯然較亞洲其他國家慢上許多。

"What we are facing now is a global movement, and Taiwan must move faster in order to maximize the benefits of AI and gain the influence to change the world." said Boice Lin, VP of Business Development, SEA, Taiwan & Hong Kong, Appier. Although Taiwanese businesses in general recognize the benefits of AI, they are apparently slower in adopting this technology compared to other Asian countries.

因為根據 Appier 與研究機構 Forrester 在今年 7 月發表的《運用人工智慧加速亞太企業數位轉型》報告中顯示，目前已有 55% 亞太地區企業已採用人工智慧技術，其中，又以印尼的採用率最高，有多達 65% 印尼企業已在使用人工智慧技術，其次是中國 63%、印度 62% 與韓國 57%，至於臺灣，僅有 44% 企業已導入人工智慧技術。

該如何加速臺灣企業對人工智慧應用的採用率？林伯翰表示，除了相關業者的持續投入，還需要加速人才培育的腳步。他說：「臺灣企業對於人工智慧的興趣是高的，只是熟悉度不夠，所以整體的採用速度較其他國家來說比較慢。」

## 人工智慧來助力 打造 C2B 商業模式

而根據前述調查發現，臺灣企業對於透過人工智慧提升顧客互動體驗的需求最高，因為有高達 63% 臺灣企業期望能透過人工智慧技術改善「預測客戶行為的精準度」，而這也正好是 Appier 長期投入的領域。

林伯翰指出，「無論企業規模的大小，我們都可以透過整合與分析和消費者有關的數據資料，更精準地掌握消費者輪廓，幫助企業以個性化的手法跟每位顧客互動。」為了協助企業預測客戶需求、即時因應市場變化，Appier 推出人工智慧解決方案，目的是幫助企業整合消費者在自家網站、App 及其他跨螢幕裝置上的數位足跡，擺脫過去單方面只有消費者認識網站的模式，讓企業可以更深入認識消費者。

According to the report "Digital Transformation Enhancement Through AI by Asia Pacific Businesses," jointly published by Appier and Forrester in July of this year, 55% of businesses in the Asia-Pacific region have already adopted AI technology. Indonesia, in particular, has as many as 65% of local businesses which have incorporated AI into business operations, followed by China - 63%, India - 62% and Korea - 57%. As for Taiwan, only 44% of businesses have adopted AI technology.

How can we increase the rate at which AI is adopted among Taiwanese businesses? Boice Lin said that two things need to happen: ongoing investment from businesses, and more intensive talent training. He said: "Taiwanese businesses are quite fond of AI; they just don't know enough about it to adopt it as quickly as other countries."

## Creating the C2B business model through AI

It has been discovered in the aforementioned study that Taiwanese businesses are most desperate about improving interactive experiences with customers through AI. As many as 63% of Taiwanese businesses expect AI to increase "the precision of customer behavior forecasting," which happens to be the area of expertise that Appier has long invested in.

Boice Lin pointed out that, "Regardless of the size of business, we can help customers establish more precise profiles of their consumers by analyzing consumer-related data, and exploring distinctive ways for businesses to interact with their target consumers." In order to help businesses predict customers' demands and react to market changes, Appier has introduced AI solutions that keep track of consumers' digital footprints on websites, apps, and other devices with screens. This approach is a huge step forward from the old days where consumers only

透過消費者的數位軌跡，再加入企業原本擁有的客戶資料，就能夠完美勾勒客戶樣貌，然後，預測客戶的下一步，在最有感的情境下推播，讓商品在對的時間推送到對的人手上，藉此提高廣告轉換率。例如為了幫助電商市場吸引更多的客戶，還有幫助知名交友軟體觸及更多跨螢受眾等。

## Step by Step 提升 對人工智慧應用的掌握度

累積許多協助企業導入人工智慧服務的經驗，林伯翰歸結出在企業中人工智慧專案成功與否的關鍵，進而提出以下建議。

首先是成立一個跨部門團隊負責統籌、規劃與推動人工智慧相關事宜。由於人工智慧涉及的範疇很廣，因此需要企業內部的跨部門團隊負責溝通協調。至於團隊成員是否都必須是人工智慧技術專家、資料科學家，林伯

翰表示，企業可以透過其網站了解客戶。但現在，企業可以透過其網站了解客戶。但現在，企業可以透過其網站了解客戶。但現在，企業可以透過其網站了解客戶。

By combining consumers' digital footprints with customers' profiles on hand, businesses can develop a comprehensive view of their customers, anticipate their next moves, and send the most appropriate message for the given scenario so that the right product is referred to the right people at the right time. In doing so, businesses are able to increase the conversion rate of their advertising efforts. For example, was able to reach more customers in e-commerce with Appier's help, while a popular social app benefited from exposure to a wider audience across multiple devices.

## Step-by-step implementation of AI

Having accumulated abundant experience helping businesses incorporate AI into service activities, Boice Lin summarized the keys to successful AI implementation and made the following recommendations to businesses.





翰有不一樣的看法：「只要是熟悉企業流程，同時，對人工智慧感興趣的員工，就是企業值得培育的人才。」理由在於，人工智慧技術仍在持續演化中，與其投入資金與資源培育人才的專業技術掌握度，先期階段不如讓外部專家來協助企業建立框架，優化流程。

其次，是透過內部資料梳理，擴大人工智慧技術的應用範疇。在透過行銷自動化或程序化廣告購買等機制，體驗到人工智慧技術為企業帶來的效益後，要想進一步擴充、深化影響力，則必須全面盤點、梳理企業擁有的數據資料。林柏翰表示，資料梳理的工作雖然繁瑣，但卻十分關鍵。「這階段建議交由企業核心培養的人才負責執行，提升其對關鍵資料的掌握度，以及數據分析能量。」

他也鼓勵臺灣企業「起而行」，將對人工智慧的關注直接轉化為實際行動，林柏翰指出：「人工智慧的一小步，卻是影響未來的一大步，對追求領先的企業來說，唯有搶快導入，才能夠暢快享受人工智慧帶來的巨大優勢，同時，成為引領市場變革的卓越企業。」

The first step is to create an interdepartmental team that collectively oversees the planning and implementation of AI solutions. Because AI is such a broad topic, it requires a team with members from different departments who are able to coordinate and communicate with each other. Do all team members have to be AI experts or data scientists? Boice Lin held a different opinion that: "Any employee who is familiar with corporate procedures and interested in AI is a talent worth training." The reason is that AI is still an evolving technology, and instead of investing resources to train talents with technical knowledge that may become obsolete, businesses should seek help from external experts in creating framework and optimizing procedures.

The next step involves tidying up the internal database in ways that can expand the application of AI technology. Many businesses have already experienced the benefits of AI through services such as marketing automation and programmatic advertising, but in order to expand influence further, businesses must conduct a thorough survey of available data and tidy it up. Boice Lin said that data tidying may be tedious, but it is a crucial step. "This task should be handled by potential talents that the company intends to develop over the long run, because the process will help them become familiar with the company's data and improve their ability to analyze it."

Lin also encouraged Taiwanese businesses to convert their interest in AI into real actions. He said: "A small progress in AI may evolve to become a decisive breakthrough in the future. For businesses that are pursuing a leadership position in their respective industries, early involvement is the only way to derive the most benefits out of AI and become the market's game changer."

# 虛擬實境夯， 全新體驗穿越空間的魔法

Virtual reality - Magic to a whole New Dimension



當 AR、VR 技術研發日益成熟，從生活到娛樂，不斷推陳出新，打破地域的限制，為消費者創造嶄新、有趣的溝通新體驗，更可以擴大商業應用，幫助企業內部溝通。

As AR and VR technologies mature, consumers are being introduced to new and fun experiences from lifestyle to entertainment, without geographic restrictions. Moreover, the technologies can be used in commercial applications to facilitate internal communication.

想擁抱身歷其境的感受嗎？現在透過 VR 與 AR 技術，企業能呈現更好的沉浸式體驗，完全打破過往消費者和產品之間的界線。

## 從生活到娛樂，創新體驗

去年在上海開幕、全球最大的星巴克門市——星巴克臻選上海烘焙工坊，導入了 AR 辨識技術，你只需打開 App 定位，一掃便可看到精美製作的星巴克咖啡烘焙、生產及煮製的過程，看見「從一顆咖啡生豆到一杯香醇咖啡」的故事，還可查詢線上菜單，在工坊裡邊逛邊等待。

而創新的體驗不僅只於此，找不到想去的地址嗎？手機 AR 步行導航可以將 AR 技術與導航功能結合，只需透過手機即可看到全景路

Have you ever wondered what it is like to be in an imaginary world where everything feels real? Now with VR and AR, businesses can deliver more immersive experience and eliminate the barrier that used to separate consumers and the products.

## Innovative experience from lifestyle to entertainment

The world's largest Starbucks store - Starbucks Reserve Roastery was opened last year in Shanghai. The store introduces a new AR application that enables consumers to view the process of how Starbucks roasts, produces, and brews its coffee simply using the designated app. In addition to viewing the story of "From bean to coffee," the app also presents an online menu and takes users on a virtual tour through the roastery while waiting.

線和終點位置，導航過程中不必反覆查看路線，只要結合語音導航、真實街景，就可以輕鬆找到方向。

還有，在智慧型手機平台上，除了 LINE、Snapchat 推出 AR 遊戲外，使用 Facebook 時，只要撥打 Messenger 視訊通話，就可以讓一次最多六人同時線上玩 AR 遊戲！

在臺灣，這些創新的體驗也不斷在發生。「想參觀房子一定得出門嗎？」、「想買下這張桌子，但不知道我家餐廳尺寸合不合？」現在你可以透過 AR 技術，用平板電腦、手機下載 APP 參觀實品屋，或是直接在居家空間實景擺設新傢俱，任意切換裝潢風格。

這些技術背後的推手正是「iStaging 愛實境」，他們的服務對象不只在臺灣，還跨足國際，觸角延伸到房產仲介、設計家具、精品、電商及旅遊等產業；為 Google、Intel、ARM、Microsoft、ASUS 等品牌打造 AR/VR 新服務。

## 以創新技術 專注空間的溝通

「我們的發展主軸一直專注在『空間的溝通』。」iStaging 愛實境台灣區總經理方怡



The innovation does not stop there. For those who can't find their way to the designated location, Google Map is introducing a new feature called AR Walking navigation that combines AR technology with navigation to show users a full view of their route and destination, all on the phone. Users no longer need to check street names repeatedly during navigation, but can simply follow voice instructions and match street views shown on phone to find the right direction.

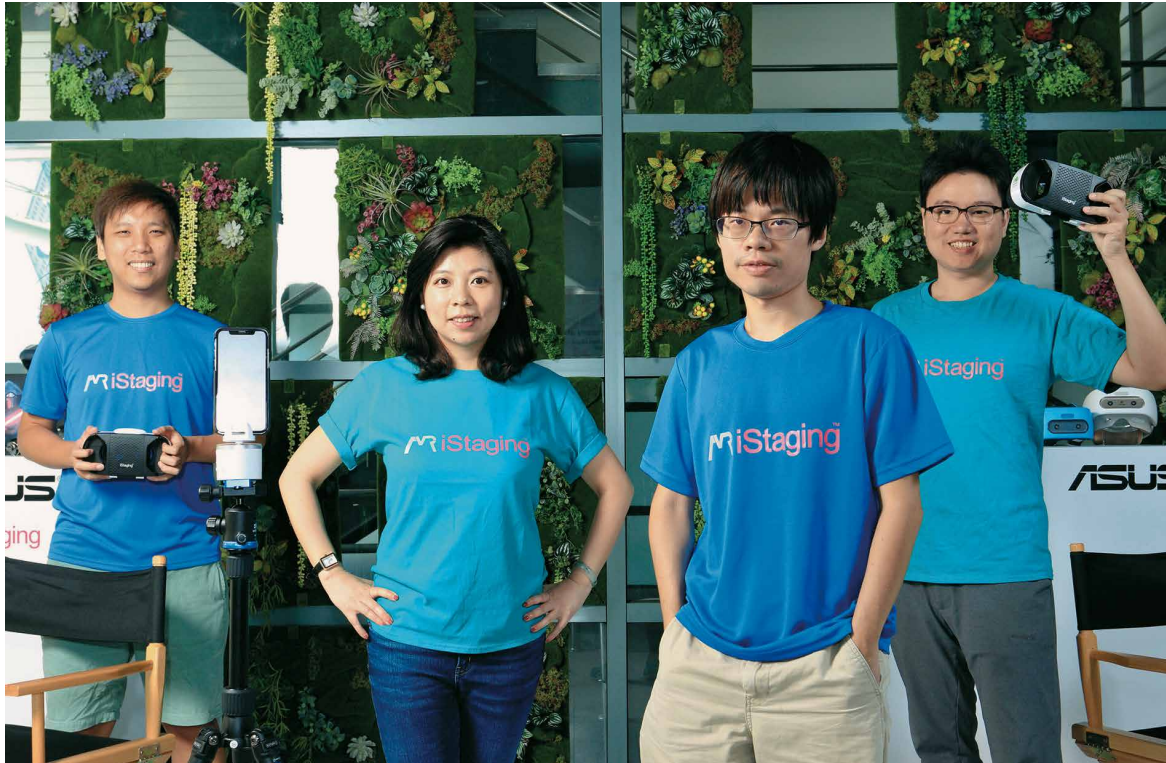
Meanwhile, smartphone apps such as Line and Snapchat have launched AR games onto their platforms, while Facebook allows up to 6 people to play AR games by video conferencing over Messenger.

New experiences are being introduced in Taiwan as we speak. For those of you who wonder: "Do I have to leave home to view a property?" or "I want this table, but I am not sure if the size matches my dining room," now you can actually use AR technology to your benefit. Simply download an app onto your tablet or phone to view the property you are interested in, or place virtual furniture against the actual background of your home to see how it matches. You can even change decorations to your liking.

"iStaging" is the mind behind all these applications. They provide AR/VR service not only in Taiwan, but in other parts of the world as well, with customers ranging from real estate agencies, designer furniture, boutiques, e-commerce and tourism industries, including renowned brands such Google, Intel, ARM, Microsoft, and ASUS.

## Communication of space through innovative technology

"We have always focused on the communication of space." said Yi-Wen Fang, General Manager of iStaging Taiwan. Founded in 2010, iStaging first began its business by shooting 360-degree views of property units using a single cellphone for real estate agents, which, when combined with certain apps, enables consumers to "view properties online" and saves time for real estate agents.



雯分享，成立於 2010 年，iStaging 最初靠著一支手機、結合 APP，幫助房仲業者拍攝房屋現場 360 度實景，讓消費者隨時可以「線上看屋」，幫助房仲提高效率。

此外，空間溝通的創新還可以在真實居家空間中加入虛擬家具影像，串聯起房仲、室內設計師、家具商與消費者間的關係，讓消費者不出門也可以賞屋、思考裝潢風格、想像未來居家的樣貌。

穿越實境技術不僅提供房仲「線上看屋」的創新服務，同樣的創新也可以跨足到汽車產業，消費者可以透過「線上看車」的方式，快速體驗不同嶄新車款的配備。其他包括教育、旅遊等也有 VR、AR 的需求，因為創新的服務不僅節省大把的時間，更幫助跨國企業加快溝通的速度與精準度。

「我們可以幫助跨國企業打破時空與地域的限制，做好內部的溝通，例如當國際品牌想跨海設點時，設計師不再需要飄洋過海，就得以遠端進行跨國展店、佈櫃的工作。」方怡雯總經理分享。

This innovative way of communicating space also allows users to place virtual images of furniture against an actual home space, thereby enabling real estate agents, interior designers, furniture merchants and consumers to visualize their ideas. As a result, consumers can view properties, choose renovations, and imagine the look of their future house without leaving home.

Immersive reality not only enables "online property viewing" for real estate agents, but the same idea can also be applied to the automobile industry for "online vehicle viewing," providing consumers with a quick experience of the different accessories each new car has to offer. Education and tourism, too, have needs for VR/AR, because the innovation not only saves great amounts of time, but also helps multinational companies communicate at higher efficiency and precision.

"We have the ability to help multinational companies work outside the constraints of time, space, and location to improve internal communication. For example, when an international brand is looking to establish a new branch overseas, the designer no longer needs to be physically present, but has the option to supervise the expansion and setup remotely," said General Manager Yi-Wen Fang.

## 專注創新模式， 大膽競逐國際舞台

iStaging 愛實境研發長張騰文也分享專注創新商業模式的思維，「我們花了很多時間在研究使用者的痛點和需求，關注軟體與服務、而非硬體。」例如從 360 度 AR 實景到 720 度全景，並延伸到目前 OMO (Online Merge Offline) 的形式，可以將房仲業者與看屋者的語音對話轉為文字，累積為未來分析消費者使用行為的數據庫，以幫助銷售優化。

尤其是當市場持續擴大、有需求的客戶與產業不斷增加，一套解決方案不可能滿足所有人。iStaging 抱持開放共享的態度，開放軟體開發工具、應用程式介面，讓客戶能在既有的平台基礎下，針對各自營運的需求，自行開發解決方案，打造出專屬企業的獨特服務。

立足臺灣、放眼國際，iStaging 的豐碩成果來自於既有的人才與技術優勢，方怡雯總經理觀察，「臺灣人才的素質很不錯，只是年輕世代在國際觀、創業的衝勁上還需要更多的鼓勵。」

在現今的創業與職場氛圍下，她認為改變現況的方式就是給予人才更多的刺激，她也期盼政府能透過更具體的政策引導，鼓勵年輕世代勇於創業、大膽創新，一起探索未來人工智慧的創新應用，未來在國際的舞台上，勇敢競逐。

## Focusing on innovation and pursuing international opportunities

Teng-Wen Chang, Chief Research and Development Officer of iStaging, shared the company's focus on innovative business models: "We spent a lot of time studying users' pain points and needs, and focused on software and service, instead of hardware." For example, the company began with 360-degree AR and eventually expanded it to 720-degree full view and to the OMO (Online Merge Offline) service today. Conversation between real estate agents and potential customers are converted into text and stored on a database, which may someday be used to analyze consumer behavior and optimize sales.

This database is especially essential because as the market expands, the company will encounter demands from different customers and industries, by which time a single solution will no longer be adequate to satisfy everyone. iStaging adopts an open and sharing mindset when developing software, tools, and application interfaces. The company provides customers with the freedom of developing their own solutions and unique services on the existing platform based on their individual needs.

iStaging's success in Taiwan and growing reputation in the world were made possible by the company's exceptional talents and technical advantages. As General Manager Yi-Wen Fang has observed: "Taiwan produces excellent talent; the only things that the young generation needs are global vision, ambition, and more encouragement."

Given the prevailing startup environment and workplace culture, Fang believes that the best way to grow out of the current state is to provide talent with more incentives. She hopes for the government's involvement to guide and encourage the younger generation when starting new businesses and seeking new ideas about how we can explore AI. She foresees a future where Taiwanese talents may compete head-to-head with the most innovative minds in the world.

# AI、5G、8K— 2020 年東京奧運 實現數位想像

## AI, 5G and 8K to be Realized at the 2020 Tokyo Olympics

數位浪潮下，舉世期待新科技創造更美好、更精準的運動賽事體驗，以人工智慧及尖端科技聞名於世的日本在即將到來的 2020 年東京奧運上，又將向世界具體展現哪些資訊科技「美夢成真」的成果與體驗？

The ongoing wave of digital innovation presents prospects for better and more precise sports competition with the help of new technology. As the summer Olympics moves to Tokyo in 2020, how will Japan, a country known for AI and scientific advancement, incorporate information technologies to bring new dreams and experiences to the global audience?



### 精準安檢： 臉部識別奧運初登場

日本電氣（NEC）綠火箭橄欖球隊球員後藤輝也（Teruya Goto）日前於日本東京舉辦的展示記者會上與 NEC 為東京奧運所開發的臉部識別系統合影——2020 年東京奧運可望成為史上首屆採用臉部識別技術加強安檢作業的奧運比賽。

NEC 表示這項技術早於 2016 年里約奧運時即已在機場及不同地點建置測試。在公開展示記者會上，這項技術正確無誤地辨識不同人，其中包括使用輪椅者以及不同身高的人。

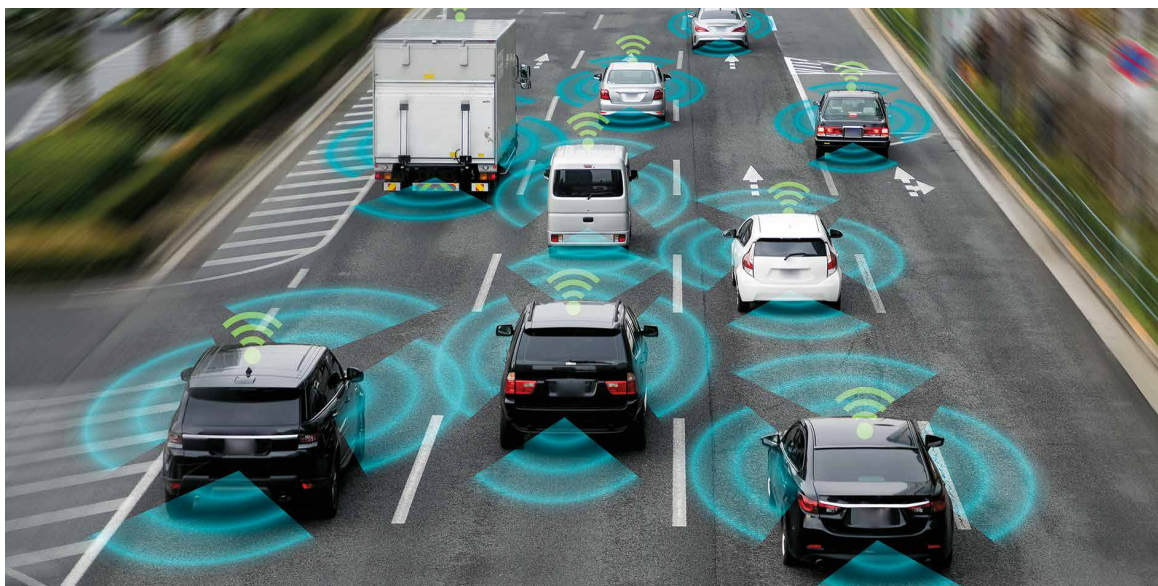
這項在識別卡內建晶片的技術可自動辨識入場者身分，將於包括主賽館、國際廣播中心

### High-Precision Security Control with Facial Recognition

Teruya Goto, rugby player for the NEC Green Rockets team, was present at a recent press conference in Tokyo where NEC showcased the facial recognition system the company has developed for the Tokyo Olympics. The 2020 Tokyo Olympics may be the first Olympic Games in history to officially adopt facial recognition for security checks.

NEC explained that this technology has already been tested during the 2016 Rio Olympics at the airport and various locations. The showcased technology was able to correctly recognize different faces at the press conference, including people in wheelchairs and of different heights.

An ID card with a built-in chip enables automatic recognition of a visitor's identity. It will be issued



與奧運選手村等 40 多個賽事相關場地，針對超過 30 萬名選手、工作入員、志工與媒體人員，目的在於強化安檢以及大幅減少選手們的等候時間，而主辦單位將不針對廣大觀賽民眾進行此項措施。

有鑑於東京地狹人稠，許多賽事空間未必有條件建置完善的安檢設備，或提供等候安檢的排隊空間；再加上奧運於 2020 年 7 月正式登場，在炎熱難耐的盛夏氣候下如何因應前來觀賽的人潮？這些考量促使東京奧運主辦單位採用臉部識別系統作為解決方案。

## 人工智慧導引系統： 解決賽後交通問題

由於預估 2020 年 7 月至 9 月東京奧運舉辦期間，將有 1 千萬遊客參與這項運動盛會，日本政府計畫採用人工智慧建置導引系統以解決交通擁塞問題。這項導引系統將協助遊客於比賽結束後每半小時，由智慧手機上接收來自場地四周電子儀板傳輸的擁塞預測，並提供前往地鐵車站較不擁擠的路徑指引。系統亦將協助有效派遣保全人員前往預期有大量人潮的地點，提早進行調節與疏散。

這項以人工智慧為基礎的導引系統將透過路邊攝影機以及在智慧手機上使用網際網路的人數獲取必要人流資訊，進而發出擁塞預測，

to over 300,000 athletes, staff, volunteers and media personnel, and used at more than 40 locations including the Olympic Stadium, International Broadcasting Center, and Athletes Village as an enhanced security measure and to reduce athletes' waiting time. The organizer has decided not to issue this security token to the general audience.

Tokyo is a highly populated city, which means that many of the places where the games take place may not have adequate space to install proper security equipment or have people queue up for security checks. Furthermore, if the Olympics is to be held in the middle of summer in July 2020, what should the organizer do to shorten the time visitors spend standing under the unbearable heat? These were the considerations that motivated the organizer to adopt facial recognition as the solution.

## AI Guidance System for Post-Game Traffic

The Tokyo Olympics is expected to attract 10 million tourists to the city between July and September 2020, and the Japanese government plans to adopt an AI-powered guidance system to resolve traffic congestion. For every 30 minutes after the end of an event, the guidance system will predict congestions near the venue and tourists may receive updated instructions through their smartphones to the less crowded subway stations. The system will also be helpful for dispatching security personnel to locations



但與此同時日本政府亦須在使用這項數據時確保個人資訊不外流或濫用。

回顧 2016 年里約奧運時，會場周遭交通擁塞是一大問題，當時僅針對車輛進行交通管制與排解。中國大陸電子商務巨人阿里巴巴也於平昌冬季奧運上展示了一套交通控制系統，預計於 2022 年北京冬奧正式上線運行。

日本政府則計畫於東京奧運結束後，也會將這項新導引系統所獲得的經驗與技術運用在未來的災難應變措施上，例如緊急疏散或撤離。

## 高速巨量： 5G 推動創新賽事體驗

過去日本在 1964 年東京奧運開通高速鐵路，彩色電視於奧運賽事後成為主流，而 2016 年里約奧運日本 NHK 試播 8K，創下全球首例，顯見當前國際大型運動賽事已然成為資訊科技、乃至數位與網路技術的最佳練兵場與實驗場域。

當 2018 年世界盃足球賽導入影像判裁技術，同年平昌冬奧，南韓政府大手筆展現 5G 傳輸來向全世界證明其資通訊實力，更被譽為最高科技的奧運賽事，因此全球莫不聚焦

that are expected to become crowded, so that the crowd can be controlled and directed away at the earliest time.

This AI-powered guidance system will calculate crowd size through roadside cameras and based on the number of smartphones connected to the Internet, and predict congestion accordingly. To implement this system, the Japanese government must assure that personal information is not leaked or abused in any way when processing data.

Looking back at the 2016 Rio Olympics, congestion near event venues presented a major problem, and at that time only vehicle traffic was controlled and directed. Alibaba, the Chinese e-commerce giant, previously demonstrated its traffic control system during Pyeongchang winter Olympics, and the system is expected to be launched online for the 2022 Beijing winter Olympics.

After the Tokyo Olympics, the Japanese government plans to apply the experience and technologies gained from this new guidance system in future disaster response for purposes such as emergency evacuation.

## New Event Experiences with High-Speed 5G

Japan has had significant success introducing new technologies in previous Olympics games. The 1964 Tokyo Olympics inspired the construction of the high speed rail and made color TV popular afterwards, whereas during the 2016 Rio Olympics, Japanese TV company NHK made the first attempt in the world to broadcast games in 8K resolution. It is increasingly popular for international sport events to be used as the testing ground for information, digital and network technologies nowadays.

In 2018, the audience was introduced to several ground-breaking technology applications from the video assistant referee (VAR) used in FIFA to the 5G mobile Internet demonstrated at Pyeongchang winter Olympics held in South Korea; the latter was even praised as the most

2020年東京奧運，看日本將如何運用5G與8K等尖端科技。

由易利信（Ericsson）及產業及經濟分析機構IHS Markit聯合進行的一項研究顯示，未來五年內全球將有十億人口成為5G使用者，至2030年代中期預計可帶來高達12.3兆美元的全球經濟產量（economic output）。

由於傳輸速度大幅提升，5G開啟了連工程師們都還無法確切體會的潛在可能性，一如當年iPhone問世後為生活型態帶來前所未有過的創新與影響。而5G無線網路以其驚人高速為特色，較4G快上百倍，因此成為實踐智聯網的最佳骨幹，要在冰箱、交通號誌乃至於寵物項圈之間傳遞訊息與溝通數據，再也不是天方夜譚。

科技業對5G寄以厚望，因為無論是人工智慧、無人駕駛機、自駕車、機器人與其他即時傳輸大量數據的機器，5G的高速巨量能力正是發展關鍵，以人類學習以語言溝通交談來比喻：4G時代電腦間宛如兒童間的簡單對話，則5G將會如同成人間的論述與交談。「這是機器的時代，」英特爾資深副總裁里維拉（Sandra Rivera）在一次訪談中說道，「5G則是同時具備真實演算與溝通能力的重要推手。」

## 告別4K， 迎向全視角8K觀賽體驗

日本超高畫質電視（Super Hi-Vision (8K)）自2016年開始測試傳輸以來，不但讓直播電視（Direct to Home, DTH）衛星使用更為廣泛，同時日本代表性消費者電子用品製造公司（包括Sony、Panasonic、Canon）在高階攝影機與消費者顯示設備的研發與產品經驗上皆臻於成熟，東京奧運顯然是展現此一尖端技術發展的最佳舞台。

high-tech Olympic games in history. Given the success of these forerunners, the world eagerly awaits how Japan will be incorporating 5G and 8K technologies during the 2020 Tokyo Olympics.

According to a joint study conducted by Ericsson and IHS Markit, an industrial and economic analysis institution, the number of 5G users worldwide will grow to 1 billion over the next 5 years, and the new communication technology is expected to generate US\$12.3 trillion worth of economic output worldwide by the mid 2030s.

5G offers such a drastic improvement in transmission speed so even the engineers themselves can not imagine the technology's full potentials, but it will undoubtedly bring unprecedented innovations and impacts similar to what the iPhone did a decade ago. What makes 5G so fascinating is that it transfers data 100 times faster than 4G, which makes it the ideal infrastructure for Analytics of Things. Transmitting information and data between refrigerators, traffic signals or even pet collars will no longer exist only in the imagination.

The technology world has high hopes for 5G because its ability to transfer large volumes of data at high speed is crucial to AI, drones, self-driving cars, robots and any machine that requires real-time data transfer. If we were to compare communication technology with the human language, 4G involves a level of complexity comparable to children's dialogue, whereas 5G would be as sophisticated as arguments and discussions between adults. "We live in an era of machines," said Sandra Rivera, Senior Vice President of Intel, in a previous interview, "and 5G is crucial to making algorithms and communications work."

## Say Goodbye to 4K and Embrace 360-degree 8K Sporting Experiences

Ever since the trial broadcast of Super Hi-Vision (8K) in Japan in 2016, uses of Direct to Home (DTH) satellite have become popular, while renowned Japanese consumer electronics manufacturers (such as Sony, Panasonic and

然而對眾多廣播服務提供者來說，是否要先投資購入 4K 技術與裝置以獲取些許經驗值，還是要再等幾年直至 8K 技術更為普及，是一項值得深思的課題。許多業者願意等待高效率視訊編碼（High Efficiency Video Codec）有更進一步成果以支援 8K 技術播放，然而或許選擇 8K 與否的最大挑戰，不在於影像擷取、工作流量或後製方面的問題，而在於傳輸能力是否能支援。

經過多年發展，8K 超高畫質電視對觀眾的吸引力大增，試想無須戴上特製眼鏡即可感受真實 3D，將會是多麼美好的觀賞體驗。這一切都有待時間考驗，但 2020 年東京奧運無庸置疑為業界帶來全力以赴的目標與動力。

## 東京奧運實現數位時代新想像

本次奧運官方供應商為日本資通大廠 NTT DoCoMo，計畫配合奧運時程於 2020 年啟動商用 5G 網路。NTT DoCoMo 執行長吉澤和弘（Kazuhiro Yoshizawa）認為 5G 有助於開創新服務，解決社會議題，而東京奧運正是最佳標竿典範，充分展現 5G 速度更快、等待時間更短，且容量更大，是滿足人們需求的完美解決方案。

經濟學人智庫（Economist Intelligence Unit）東南亞區總監史塔波（Andrew Staples）表示，數位科技在東京奧運的運用可望帶來更多來自「由基礎建設打造的工具與設備」而產生的經濟收益。

東京奧運組織委員會發言人高谷正哲（Masa Takaya）則觀察到許多頂尖企業贊助商開始為 2020 年奧運而投入創新投資，在賽事期間可預見最新款燃料電池車（Fuel Cell Vehicle, FCV）、自駕車、網路資安機制（cyber security initiatives）以及自動多

Canon) have been able to make break-through advancements with respect to high-end video recorders and consumer displays; the Tokyo Olympics presents the ideal opportunity to demonstrate the above technologies.

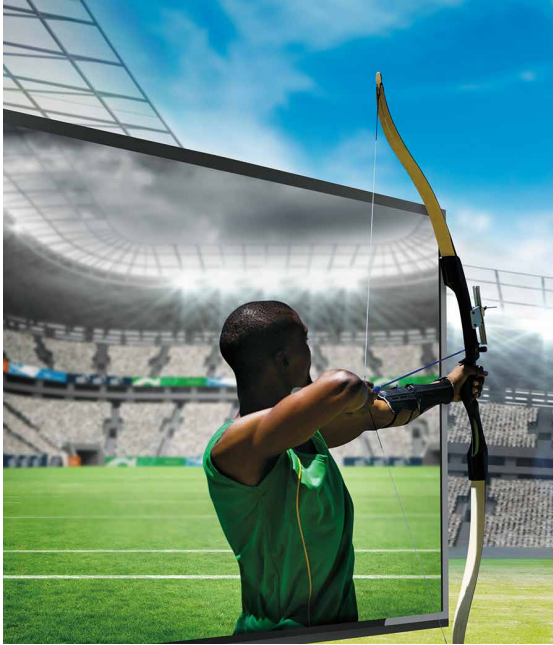
However, many broadcast service providers are presented with the dilemma between investing in 4K technologies now or waiting a few more years until 8K becomes popular. Many businesses are willing to wait for further advancements of the High Efficiency Video Codec and its eventual support for 8K playback, but perhaps the largest challenge that deters businesses from adopting 8K lies not in image capturing, bit rate, or post-production, but in transmission capacity.

After many years of development, consumers are starting to appreciate the prospects of 8K resolution; imagine the kind of viewing experience we may have to watch true 3D without putting on special glasses. Needless to say that it takes time to realize the vision described above, but the 2020 Tokyo Olympics provides industry participants with the goals and motivation to move forward.

## New Imagination of the Digital Era to be Realized During the Tokyo Olympics

NTT DoCoMo, the Japanese telecommunication giant, is the official supplier for the upcoming Olympics. The company has made plans to begin commercial operation of its 5G network by 2020 to accommodate Japan's hosting of the Olympics. Kazuhiro Yoshizawa, CEO of NTT DoCoMo, believes in the potential of 5G technology to open up new services and resolve social issues, and the Tokyo Olympics presents the ideal opportunity to introduce 5G as the perfect solution to everyone's needs because of the faster speed, shorter waiting time, and larger data capacity.

Andrew Staples, Director of Southeast Asia Region for the Economist Intelligence Unit, said that the use of digital technology during the Tokyo Olympics may derive more economic output from "infrastructural tools and equipment."



語言翻譯等。其他可望呈現於世人面前的高階技術與服務還包括：

- 超高解析畫質錄影：360 度全視角 8K 錄影串流將自奧運比賽現場的超高解析度裝置上傳進行即時傳送，透過不同廣播頻道放送至全球各地的智慧手機或虛擬實境耳機裡，英特爾首席策略長艾凡斯（Aicha Evans）認為：「與其說坐在海灘上看選手衝浪，不如說觀眾們以為自己正與選手們在浪板上破浪前進。」
- 智慧城市感測器與高網路連結車輛：這些技術將改變遊客們在東京的移動模式，由於 5G 網路帶來獨特的資料密集工作量，英特爾與其他奧運合作夥伴將可為車輛提供最新 5G 溝通功能。
- 協助選手們使用電子保健科技與數據分析來強化比賽效益：巨量數據的取得與分析協助他們修正訓練計畫，穿戴式智慧保健設備與擴增實境 / 虛擬實境模擬可透過 5G 網路優化，達到以人工智慧協助選手在賽事有最佳表現的效益。

透過 AI、5G 及 8K 技術，讓日本東京奧運精彩可期，從數位科技創新應用帶來的美好體驗，正從你我眼前展開。

Masa Takaya, spokesperson for The Tokyo Organising Committee of the Olympic and Paralympic Games, said that many world-renowned sponsors have begun investing in innovative projects for the 2020 Olympics. By the time the games begin, we may see new technologies such as fuel cell vehicles (FCV), self-driving cars, cyber security initiatives and automatic multi-language translation in action. Other high-end technologies and services that may become ready to be unveiled to the world include:

- High-resolution video recording: 360-degree 8K video recording and streaming live from the game site through high-resolution devices; these images can be broadcast through different channels to smartphones or VR headphones all over the world. Aicha Evans, Chief Strategy Officer of Intel, said: "Rather than sitting on the beach and watching surfers surf, the audience can actually put themselves alongside surfers and surf through the waves."
- Smart city sensors and networked vehicles: these technologies will change the way tourists move in Tokyo. In light of 5G's intensive data processing capabilities, Intel and other Olympics partners may bring communication features into vehicles using the latest 5G technology.
- Digital healthcare and data analysis for performance enhancement: gathering and analyzing large volumes of data may help athletes fine-tune their training programs, whereas wearable devices and AR/VR simulations can be optimized through a 5G network, thereby enabling AI to assist athletes in delivering the best game performance.

Prospects for AI, 5G and 8K have made the Tokyo Olympics an exciting event to look forward to, and what is more exciting is how these innovative technologies and applications may bring us wonderful experiences in the future.

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# 5G 應用與 產業創新策略 (SRB) 會議

行政院有鑑於5G世代即將來臨，將帶動典範移轉、為我國帶來產業創新契機，特以「5G應用趨勢與發展策略」、「5G頻譜及法規」、「5G時代下創新創業發展」、「未來行動智慧生活」及「5G智慧應用發展與產業化推動」議題為主軸，舉行「5G應用與產業創新策略會議」，共同訂定我國未來5G推動策略。

會議日期：107/10/29 (星期一) ~ 10/31 (星期三)

會議地點：台北國際會議中心二樓 (台北市信義區信義路五段1號)



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