

Advantech: evolution of its IoT ecosystem strategy

Guo (Ginkgo) Bai, Liman Zhao and Zhenrong Edison Wang

More than a billion intelligent and connected devices have already comprised today's "Internet of Things (IoT)." The expected proliferation of hundreds of billions more will place us at the threshold of a transformation sweeping across the electronics industry and many others.

[IBM institute for Business value \(2016\).](#)

"IoT represents an ecosystem. Advantech is committed to providing platform services for IoT integrators in the entire ecosystem and conducting cooperation with companies in the industries of healthcare, manufacturing, retailing, environmental protection, and smart cities", KC Liu, Founder and Chairman of Advantech Co., Ltd. ("Advantech") spoke confidently at an executive forum held by a well-known business school in November 2017. He was invited to elaborate on his company's IoT strategy. "IoT will experience an explosive growth in the next 15 years. For the moment, although I have yet to see any company make their fortune from IoT, but this doesn't mean we won't see it in the future. I'm convinced the IoT boom is in the offing".

After 27 years in operation, Advantech, a global leader in the field of industrial computers, redefined its vision as "*Enabling an Intelligent Planet*" in 2010, evolving into the IoT industry. Afterwards, Advantech strategically positioned itself as an "*IoT platform provider*" and an enabler for IoT applications. After carrying out a reform in terms of internal management, external cooperation, and development model, Advantech had evolved from an industrial computer maker to an IoT solution provider.

KC Liu still had fresh memories that Advantech was torn between sticking to the hardware business and switching its focus to IoT applications and services; between leveraging its wealth of experience in the industrial field and providing industry-wide platform support; and between adopting an inside-out approach to development and conducting win-win cooperation with external partners.

Something constantly on the mind of KC Liu was how to lead the company forward amid uncertainties over the prospects for the Internet of Everything. Would Advantech's exploratory business model help turn its dream about the "industrial IoT ecosystem" into reality? How would the company overcome the obstacles in the path?

From a traditional manufacturer to an IoT "Pacesetter"

As early as 1983, when Advantech was founded, Liu vowed, "*Though I cannot win a gold medal for my people in the Olympic Games, I will strive to win gold for China in the field of industrial computers.*" By 2009, Advantech had established itself as a leader in the global industrial computer[1] arena, with its business evolving from software OEM to product manufacturing to smart production, and its market expanding from Taiwan into the USA, Europe and Mainland China.

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Evolution of Advantech (1983-2009)

In 1983, KC Liu, an ordinary system integration engineer at HP Taiwan, foresaw revolutionary changes in industrial automation. Back then, industrial computers were sold with an average gross margin of 30-40 per cent (as opposed to 3-4 per cent for PCs) (Hsiao Ruey-Lin and Su-Hua Ou, 2013). However, at the unit price of over US\$10,000, a tiny market size of mainly the military and research institutes, and stringent technical requirements, many companies in Taiwan were put off in investing in the industrial computer industry. KC Liu, however, argued the application of business computers in industrial automation would open up vast business opportunities. In May 1983, along with Chaney Ho and Yuh Min Hwang – two colleagues from other HP branches – KC Liu resigned and established Advantech.

Advantech started off as an OEM by developing industrial automation software. To cater to customers' varying needs, Advantech transformed from a software OEM to a hardware manufacturer; in 1987, the company set about developing and producing a series of data acquisition cards and launched the first industrial computer three years later; in the mid-1990s, the company rolled out a series of PC-based M&P, CPU and SCM products, and launched new build-to-order service offerings to provide customers with prompt and customized services.

While concentrating on product R&D, Advantech opened a representative office in the USA, where computer technology was the most advanced, taking the first step toward the global market. After opening branches in major industrial countries (e.g. USA, Germany, Italy and Japan), the company set up Advantech China in Beijing, China in 1992. In 1999, Advantech was listed in Taiwan. The capital market gave a significant financial push to the company's development. In 2004, with the annual operating revenue of US\$300m, Advantech ranked alongside leading industrial computer manufacturers worldwide. Years of brand operation earned the company an enormous reputation in the field of industrial computers. In the same year, Advantech opened a factory in the city of Kunshan, Jiangsu Province, China, and started establishing a Greater China sales network with hubs in Beijing, Shenzhen and Shanghai. By 2008, Advantech's sales revenue had maintained an annual growth of 10 per cent, with a gross margin of 20-40 per cent.

Back then, facing internal and external challenges, Liu began to figure out how to grasp potential business opportunities to further advance the development of the company. The IoT concept captured his attention.

IoT concept in the early phase

The IoT concept was coined in 1999. Afterwards, IoT-related terms, including sensors, RFID devices and digital networks, appeared in mainstream publications worldwide. In 2005, the UN International Telecommunication Union (ITU) published the first IoT report, which stated that "We will now have connectivity for anything. Connections will multiply and create an entirely new dynamic network of networks – an Internet of Things[2]".

When seeking the next-generation technology as a new economic engine from 2006 to 2008, governments worldwide set their sights on IoT. For example, the US National Intelligence Council listed IoT as one of the "disruptive civil technologies" and pointed out that data transmission based on IoT or sensors would make a great difference to the supply chain and logistics, delivering a significant boost to the US economy and military in the long run. Around 2009, IBM came up with the "Smart Planet"[3] concept and proposed the new government should pump funds into smart infrastructure. Louis V. Gerstner, former CEO of IBM, thought the computing model underwent a revolution every 15 years: in 1965, the invention of the mainframe computers brought about tremendous changes; around 1980, personal computers (PCs) began to catch on; around 1995, the internet revolution broke

out; in 2010, following the internet, IoT would spark off another technological industrial revolution (Zhan, 2017).

In China, IoT was referred to as a sensor network. In 2009, Premier Jiabao Wen paid a visit to China R&D Center for the Internet of Things of the Chinese Academy of Sciences, in the city of Wuxi, Jiangsu Province and initiated the concept of “Sensing China”. He set IoT as one of China’s five emerging strategic industries, in the hopes that breakthroughs would be made in key technologies for the Internet and IoT.

Would IoT trigger a technological and economic boom as the Internet did? Back then, the answer was not clear. For most companies, the much-expected IoT industry was appealing, but hard to penetrate.

Advantech’s IoT strategy

Against such background, Liu saw his company’s huge potential in the upcoming IoT era. Nevertheless, the IoT strategy was called into question within the company on two fronts. Some executives argued the company should direct efforts to expand its presence in the global industrial computing market on the grounds that the IoT business could not bring short-term gains. Others thought despite its ongoing efforts to provide total solutions and transition into a service business, Advantech remained labeled as a “manufacturer of industrial control computers;” the company, which had started off as a traditional manufacturer, was ill-equipped to gain a foothold in the IoT industry.

Amid a stream of skepticism, Liu faced a critical strategic choice in 2009. He recalled, “Most employees actually sided with me. They asked me why we still remained on the sidelines, now that IoT had drawn so much attention. In fact, I had turned this issue over in my mind for a long time. IoT is a must-do business for us, as our company is in a good position”.

The argument in support of Advantech’s position was two-fold. Within the company, KC Liu advanced the concept of a “Connected eWorld” as early as 2003. He pointed out that hundreds of millions of electronic devices would be connected with humans or other equipment to deliver unprecedented services via Internet. Furthermore, after years of efforts in the industrial computer industry, Advantech evolved into the world’s leading provider of devices and solutions, with deep insights into industrial IoT, including smart manufacturing, and a deep presence in the fields of sensors, industrial communication and industrial computers.

Advantech’s path to IoT solutions (2010-2015)

In 2010, to meet the challenges in the IoT era, Advantech laid out the vision of “Enabling an Intelligent Planet” and shifted its focus to “system integrators in the digital world”, transforming its business from manufacturing to IoT. Liu realized the transformation of the company necessitated an effort to not only “reposition the company” and “readjust the vision”, but also required conducting a deep-seated reform in organizational management and innovation systems. Laying an emphasis on “altruism” in its corporate culture, Advantech broke fresh ground in exploring and actualizing a series of innovative mechanisms in internal management.

Hedgehog Concept: “Altruism-Focusing-Spreading”

Liu thought the culture of “altruism” had inspired him most to push forward the IoT strategy. The Hedgehog Concept based on the culture of “altruism” was regarded as a cornerstone for the company’s operating system and the ultimate rule it must adhere to. “Without the Hedgehog Concept, we wouldn’t have chosen to stick it out even when our company was in the worst time in charting a course through the IoT business,” said Liu.

As early as 2002, Liu was deeply captivated by the Hedgehog Concept mentioned in the book *Good to Great*. Afterwards, he put this concept into his company's business practice by laying down the Hedgehog Concept (Altruism-Focusing-Spreading) (Figure 1). Specifically, Advantech's business philosophy included: first, "Common Vision: Starting from Altruistic Passion"; second, "Focusing Separately and Becoming the Top"; third, "Spreading and Clustering". It was such business philosophy that had shaped Advantech's strategies for product diversification and internationalization in its third decade.

Liu said, "In terms of business philosophy and strategy, our company adheres to the underlying idea of Good to Great. It is my bible. Though 'altruism' is not mentioned in this book, I added it to our business philosophy". He thought an enterprise in the IoT industry should focus not on short-term profit but on industrial development, social progress, and benefits to others. He emphasized, "*It is our mission to 'Enable an Intelligent Planet'. This mission is real, and we strive to become an enabler.*"

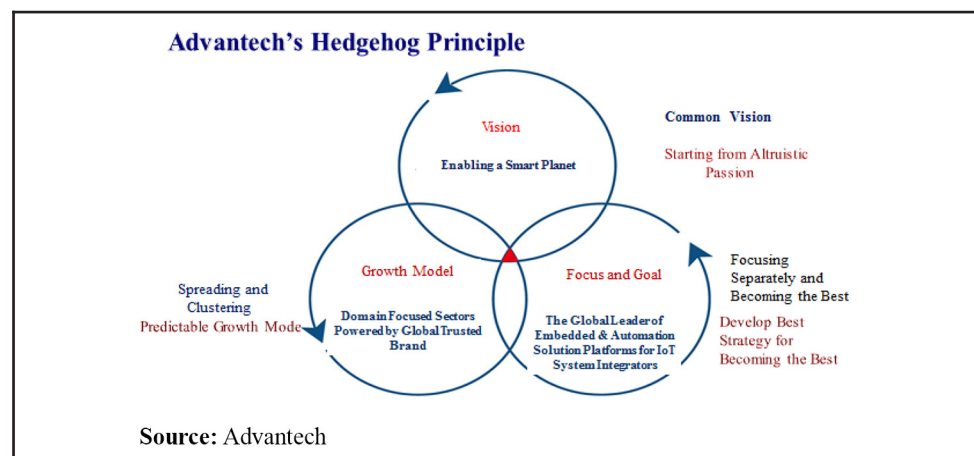
IMAX innovation system

To build a talent pool for the IoT industry, Advantech brought in the Amoeba Management model[4] to select and cultivate small units to inspire employees' creativity, execution, management, and sense of accountability. To get a head start on IoT-related fields, Advantech launched the IMAX – Incubation, Merger & Acquisition, Alliance and X Product (innovative products) – innovation platform mechanism in 2010. The mechanism applied to both internal R&D (I and X) and introduction of external technology (M and A).

Specifically, "Incubation" meant Advantech's business groups might establish and cultivate new units or R&D teams for a new sphere. In terms of "Merger & Acquisition and Alliance", business groups might buy out an enterprise, purchase its stake, or establish a joint-venture; they might also build an external R&D alliance for technological cooperation or outsourcing, with an aim of integrating and sharing resources. "X Product" was aimed at inciting business groups to upgrade existing products. Every year, Advantech's product divisions submitted their annual IMAX plan to business groups for financial planning and to Chairman Liu as well as group directors for review.

In 2010, Advantech acquired tech companies in the fields of industrial data sensing, analysis and application, including DLoG[5] in Germany, Innocore Gaming[6] in the UK, and ACA[7] in Taiwan, with the aim of taking and maintaining a lead in segmented sectors. Liu laid an emphasis on post-acquisition integration to ensure all projects were brought into Advantech's IMAX innovation system. This string of acquisitions made Advantech the

Figure 1 Advantech's business philosophy (Hedgehog Concept)



world's second largest and Asia's top brand for industrial computers, with the market capitalization of US\$1.5bn (Figure 2).

By 2012, Advantech had leapt to the top position in the global industrial computer industry. On its 30th anniversary in 2013, the company gained some advantages in terms of software, servers and sensors, making much headway in industrial automation and services. On January 10, 2014, Advantech Plus Technology Campus (A+TC) was put into operation to integrate application innovation, R&D, production and sales. In line with the trends for cross-sector collaboration in the smart industry, A+TC would jump-start the development of smart cities and IoT[8]. In the same year, Advantech Linkou IoT Campus in Taiwan came into operation.

Advantech's IoT strategy in the new phase (2015-2017)

From 2009 to 2015, IoT underwent a sea change. Our focus shifted from components like RFIS and sensors to emerging products such as smart homes, smart healthcare, smart glasses, smart bracelets, and drones. In six years, IoT came into its own [. .].

– Xinxia Wang, Deputy Secretary-General, IoT Committee of Chinese Institute of Electronics.
(IBM institute for Business value, 2016)

IoT industry chain

The IoT industry delivered services across a spectrum of industries through smart sensing, interconnectivity and deep analysis based on big data. IoT had evolved from an emerging concept to an industrial network, where the underlying layers of data sensing, data transmission, cloud platforms and service application were connected to provide vertically integrated IoT solutions for diversified application scenarios (Figure 3), including smart dispatching, smart monitoring and smart energy for smart cities; smart factories and smart production for Industry 4.0; wearable electronic devices and smart homes for smart services.

Smart and efficient data mining constituted the base layer of data sensing for the IoT industry. Presently, an array of IoT devices like sensors, integrated data terminals and

Figure 2 Advantech's post-IPO performance growth (1999-2018^e, Unit: US\$m)

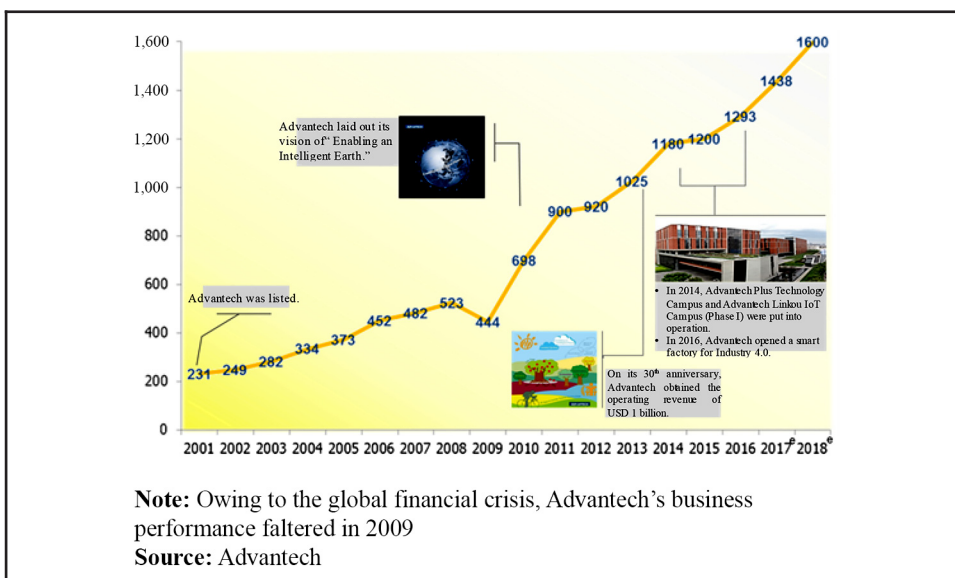
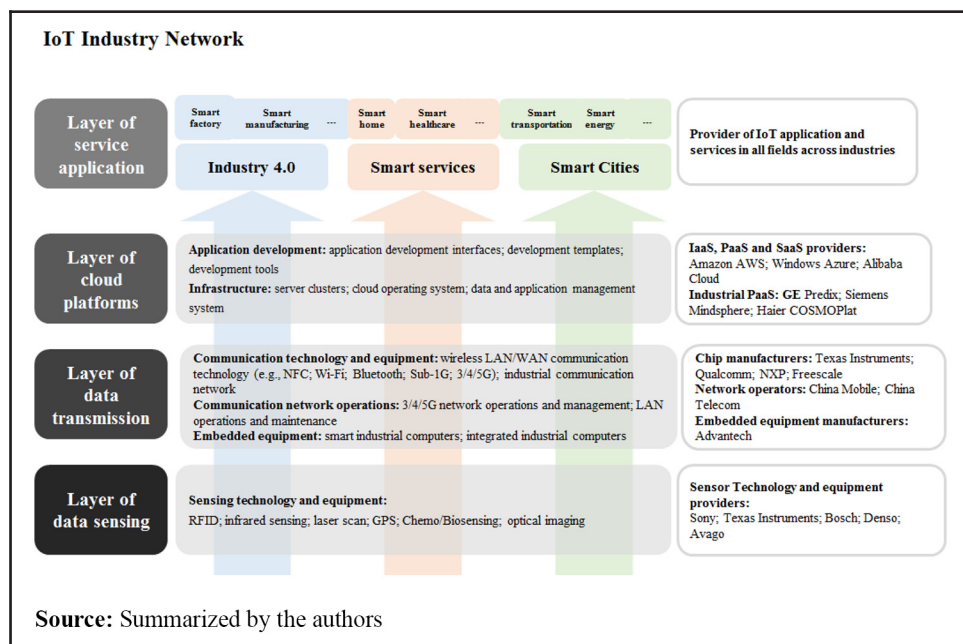


Figure 3 IoT industry network



smart identifiers were enabled by sensing technologies including RFID, infrared sensing, GPS and laser scan.

A mass of mined data needed to be assembled and processed for analysis and application. A series of communication technologies (e.g. wireless LAN, low-power WAN, industrial network and mobile network) constituted the layer of data transmission, which served as a bridge between “terminals” and “cloud platforms”. On this layer, wireless communication technologies and hardware, including NFC (near field communication), Wi-Fi, Sub-1G and 3/4G, etc. had been integrated into IoT devices.

The mass of data assembled relied on cloud platforms for management and application development. Server clusters, cloud operating systems and data and application management systems served as an infrastructure platform; application programming interfaces (API), development templates and development tools made up an application development platform to provide development infrastructure and environments for IoT applications, such as smart logistics, smart transportation and Industry 4.0. The layer of cloud platforms, which was aimed squarely at industrial applications, had attracted considerable investments from large companies and tech startups. Some examples of the IoT products and solutions available were infrastructure platforms (e.g. Microsoft’s cloud system “Windows Azure”; Amazon’s Web Services “AWS”; Alibaba Cloud and Tencent Cloud) and industrial application platforms (e.g. GE’s Predix; Siemens’s Mindsphere; Haier’s COSMOPlat).

The IoT technologies based on the aforesaid layers could be leveraged to provide diversified, customized and vertically integrated products, services and solutions for various fields. For example, in a smart factory, widely distributed sensors captured real-time production data concerning raw materials, assembly lines and semi-finished/ finished product inventory, and fed them into cloud servers through network transmission devices and data processing and integration equipment (e.g. smart industrial computers); external data about user needs and market demand could also be channeled into cloud servers. The cloud platforms stored and managed a mass of data; on the strength of development environments and templates on cloud platforms, factories could customize a

series of terminal applications, including a visualized equipment monitoring and trouble-shooting system, an inventory/raw material/purchase order management system, a real-time product quality monitoring system and a financial management system. Thanks to the advancement of mobile technology, mobile real-time monitoring applications could also be developed for factories. Along with the transmission of data from terminals to cloud platforms, and development of service applications from cloud platforms to terminals, the entire factory production process would become digital, automated and smart.

Focusing on industry 4.0 vs becoming a platform

Knowledgeable about industrial networks, Liu initiated three “S” curves for development of IoT (Figure 4): embedded equipment development curve for data sensing and transmission; cloud platform development curve for application service development; IoT cloud service curve for vertical applications. He thought these curves represented three stages for the IoT industry and represented incrementally higher values. First, hardware-based embedded equipment development, which constituted the base of the IoT industry, was in no position to produce great value. Second, cloud platforms provided development infrastructure and environments for cloud services; thus they were the core of IoT applications, generating tremendous value. Third, IoT cloud services, which targeted end users in vertical fields and segmented sectors, would face bright prospects and even likely gave birth to an array of Unicorns.

By the end of 2015, Advantech had transformed from an enterprise engaged in R&D and production to a provider of total solutions for integrated services, taking firm steps toward moving into the IoT industry. Nevertheless, the company’s largest business remained R&D and production of industrial equipment. Around 40 divisions (over 80 per cent), which remained in the first development curve, were responsible for R&D and production of sensing devices, embedded equipment and smart servers for the purposes of data sensing and interconnectivity (Figure 5).

As for cloud platforms, Advantech came up with the concept of Solution Ready Platform (SRP), which aimed to provide development environments, interfaces and templates for IoT applications in vertical industries. Before developing cloud platforms in this manner, Advantech had taken into full consideration its experience and advantages in the field of industrial control, as well as a need to differentiate itself from large IT companies. Till 2017, Advantech’s cloud platform business remained in its infancy, with six divisions engaged in the development of relevant technology.

Figure 4 Advantech’s key initiatives at each phase of industrial IoT

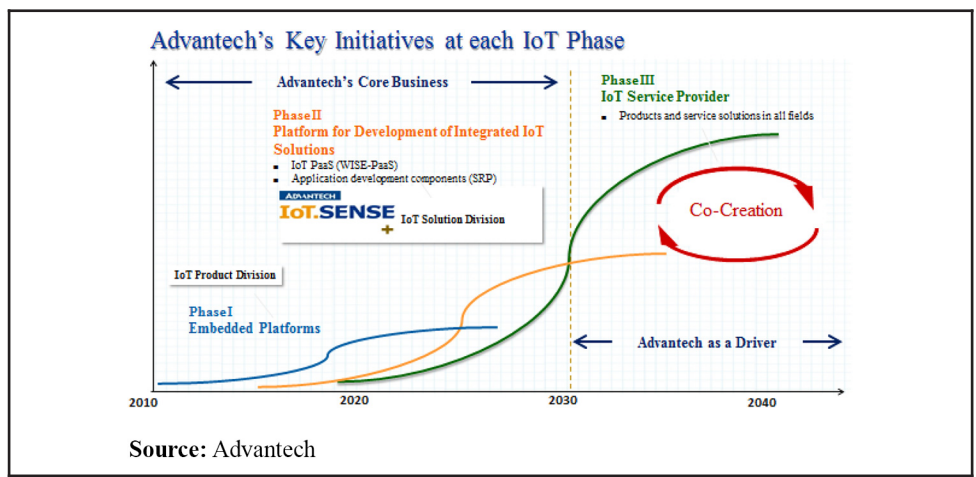
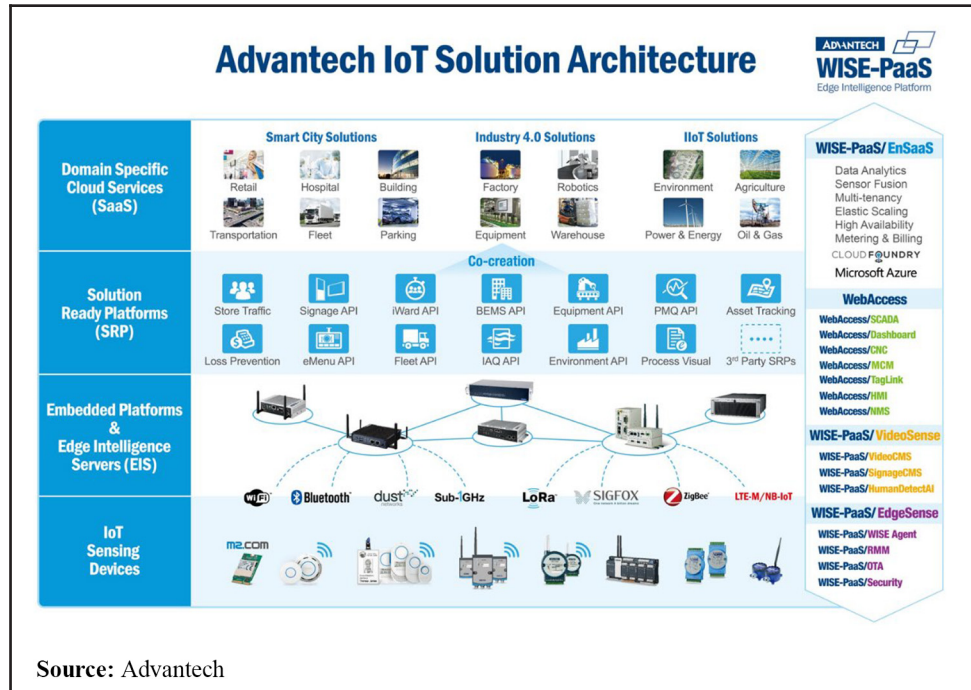


Figure 5 Advantech's IoT solution design



Source: Advantech

How would Advantech cope with the coming third stage of industrial IoT? Liu contemplated. Advantech's executives were divided over the approach. One view was that the company would need to move into the segmented sector to deliver IoT applications and solutions for smart factories, a promising sector with a colossal market size and a higher profit margin; by virtue of its strong organizational capability and abundant resources in the manufacturing industry, Advantech would probably evolve into an industrial IoT leader if it was committed to providing integrated IoT solutions for Industry 4.0.

Overview of IoT and Industrial IoT

As its name suggests, industrial IoT means the application of IoT in the industrial field, but it is more than the combination of "industry" and "IoT". By definition, Industrial IoT is aimed at enabling a flexible allocation of raw materials, production on demand, reasonable optimization of manufacturing technique, and rapid adaptation to the manufacturing environment through network connectivity, data exchange and system interoperability for efficient utilization of resources so as to establish a service-driven industrial ecosystem. Industrial IoT bears the hallmarks of smart sensing, ubiquitous connectivity, precise control, digital modeling, real-time analysis and iteration and optimization.

"Smart sensing" constitutes the basis. In the industrial IoT system, sensors and RFID devices are leveraged to mine information and data in different dimensions during the total industry lifecycle. "Ubiquitous connectivity" is a precondition. Industrial resources are interconnected through a wired or wireless network and connected with the Internet to ensure interoperability of industrial data. "Digital modelling" is a method. Industrial resources are mapped to dataspace through digital modeling; with a strong ability for information processing, dataspace can inform decision-making on operations of the industry chain for industrial IoT. "Real-time analysis" is an approach. Abstract data are visualized in digital space through real-time processing to ensure a real-time response to external physical entities. "Precise control" is a purpose. Industrial IoT aims to enable precise information exchange and seamless collaboration among industrial resources.

“Iteration and optimization” is an effect. The industrial IoT system is capable of continuous self-learning.

The implementation of industrial IoT spans four stages: smart sensing control; ubiquitous interconnectivity; deep data application; and innovative service model. [Source: *White Paper on Industrial Internet of Things (2017)*, China Electronics Standardization Institute]

Another view was that the company should strive to gain access to new capabilities and resources so as to become a platform leader and enabler, for more companies that were making a foray into the IoT industry, rather than focusing on a segmented sector only. These dissenting opinions put KC Liu in a quandary.

Staying true to the original aspiration

Liu was aware that Advantech was well-equipped to become an integrator focusing on Industry 4.0 and could even dominate the field of industrial IoT applications and services. He admitted, “After weighing this option for a long time, we have given it up. The biggest reason is that we must stick to the Hedgehog Concept and stay true to our aspiration for altruism and vision of ‘Enabling an Intelligent Planet’”.

As Advantech’s core customers, industrial companies such as GE, Siemens and Haier, were exploring approaches to smart manufacturing. The choice of being an integrator and service provider in the field of smart manufacturing meant Advantech would have to pit itself against the existing customers, a result that would deviate from its original aspiration for altruism and hold back the development of the industrial ecosystem. Besides, industrial IoT did face broad prospects, but smart cities, smart retailing, smart transportation and smart home would also open up many opportunities (Figure 6). Expanding the presence in the industrial IoT industry would mean giving up ample opportunities in other fields.

After reviewing its mission and analyzing its prospects, Advantech ultimately decided to establish itself as an IoT system and platform provider for all IoT applicable sectors (rather than one isolated sector) and made an iteration of its WISE-PaaS architecture (Figure 7).

Liu explained, “IoT is, in essence, an ecosystem, where interfaces need to be developed for a variety of sensing devices. We excel at developing smart interfaces. For the moment,

Figure 6 Potential economic impact of IoT in 2025

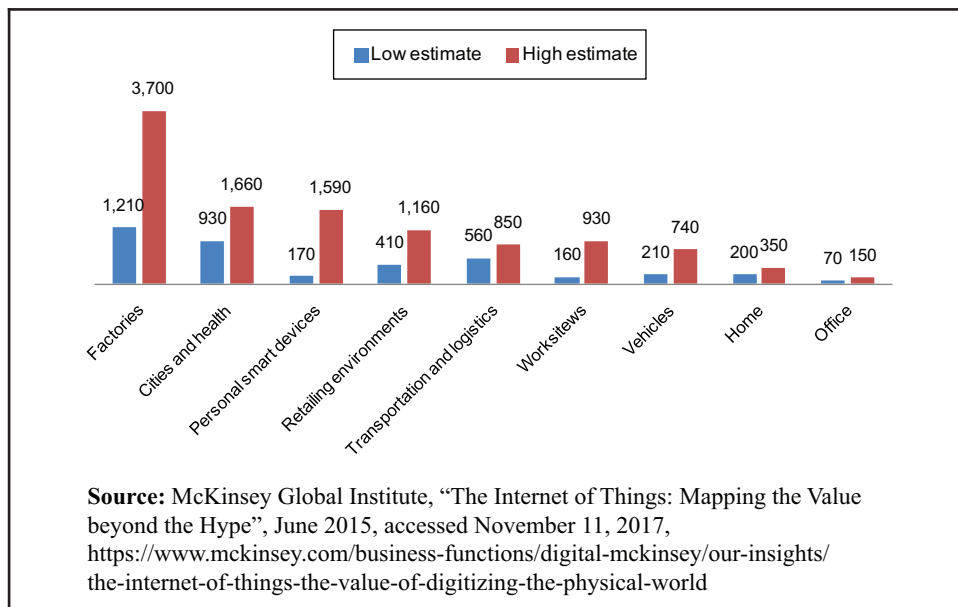
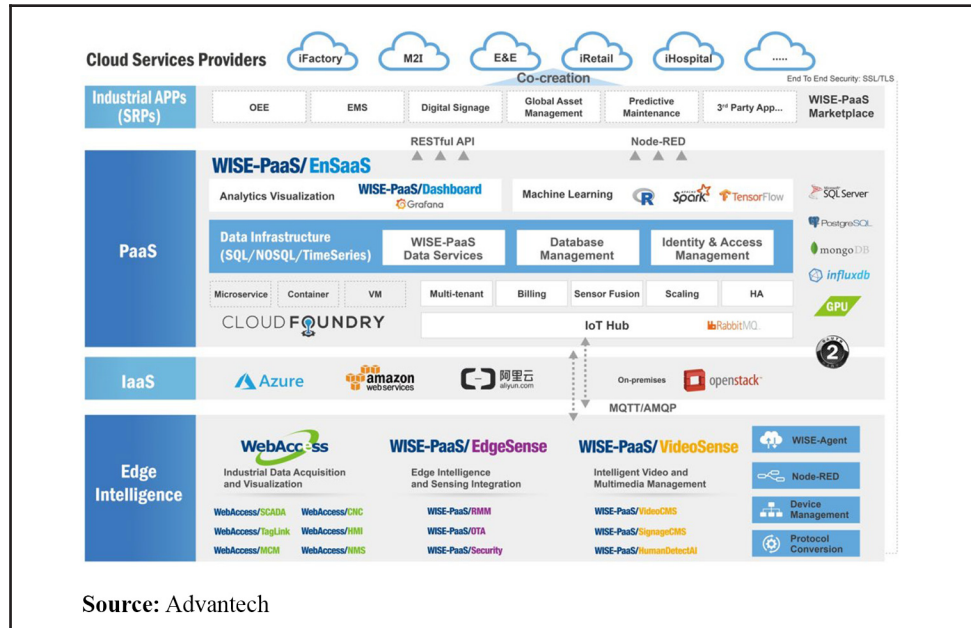


Figure 7 Advantech's WISE-PaaS 2.0 Architecture



cloud software[9] development is beyond our R&D ability, so we have yet to dip our toes into it. But we are capable of developing semi-finished client software for integrators in the spheres of healthcare, retail, environmental protection, agriculture and parking lots. In other words, we provide services for them so that they can be effectively connected with the layers below”.

Liu gave an engaging metaphor, “Suppose we were selling a variety of dishes made of beef. We are unable to cook the dish ‘Mapo Tofu (spicy ground beef tofu)’ for you right now, but we can prepare for you the required ingredients. As many integrators master the required technology themselves, there might no longer be any market demand for us to make this dish in five years. But at least now, our ‘ingredient preparation’ service remains indispensable”.

Only cooking a dish offered an opportunity to prepare the required ingredients and to improve the ability for ingredient preparation. Advantech’s cloud platforms – WISE-PaaS or SRP – relied on IoT applications and services in segmented sectors to demonstrate their real value and bring economic benefits to the company; Meanwhile, its cloud platforms would only undergo iterations for ever-changing application scenarios and needs, during their application and proliferation across a spectrum of industries. It would be a great challenge for Advantech to promote the application of its cloud platforms in the fields of industrial IoT, smart cities, and smart services.

Furthermore, IoT products, services and solutions were geared to real needs of corporate customers. Advantech found it rather difficult to identify these needs, which were presented by external customers. The Advantech-initiated IMAX system was driven by internal demand for “inside-out” innovation, while IoT services tended to be driven by external needs, introduced from outside and based on innovation by customers. Liu had given much thought to the mismatch in between.

Advantech’s “co-creation” approach to IoT services

Competition in the IoT market will be no longer about products but about the ecosystem. Harmonious coexistence and collaboration among players will be required for the IoT ecosystem.

– Xinxia Wang, Deputy Secretary-General, IoT Committee of Chinese Institute of Electronics.
(IBM institute for Business value, 2016)

To marshal superior industrial resources, Advantech had decided to take the “co-creation” approach to delivering IoT application services in the fields of smart cities, smart healthcare, and smart transportation. The so-called “co-creation” meant Advantech would seek partners for IoT application scenarios (smart cities, smart factories and smart services), launch a co-creation project and build a co-creation team to incubate a co-creation entity. Advantech would provide cloud platforms and technical support, while its “co-creation” partners would be responsible for application scenarios and needs. The two sides would join hands in drawing up programs for customized IoT services based on Advantech’s cloud platforms (WISE-PaaS and SRP) to satisfy specific industrial demand, and in launching automated and smart IoT products for segmented sectors. In addition, Advantech could bring into full play its technological advantages and experience in the area of data sensing and transmission to create underlying hardware architecture so that “co-creation” and the existing business could produce synergy effects.

Simply, Advantech would try to team up with its partners through “co-creation” in the areas of data sensing, data transmission and cloud platforms to deliver integrated solutions for vertical industries (Figure 8).

As for the pattern of growth, Advantech, a provider of IoT platform solutions, and companies in traditional industries (e.g. traditional manufacturing, environmental protection, retailing and health care) set up a co-creation team and can bring in third-party high-tech professionals. The co-creation process was below: First, the two sides needed to lay out a vision for co-creation on the basis of knowledge sharing, draw up a business plan and conduct market research; second, the two sides would jointly carry out the business plan by designing solution architecture, an operating model, organizational architecture, budgeting, and an equity allocation program; third, they needed to finalize the business plan and set up a co-creation firm, where team members from both sides were in charge of technological development, appointment of key managers and design verification and adjustment; fourth, directors and other key managers took up their post and nail down the equity allocation program before getting down to running the co-creation company. It might raise funds internally or externally, or mount marketing campaigns (Figure 9).

Liu spelled out the differences between a “co-creation” company and other startup teams or joint-ventures, “We don’t set up a company from the outset. The team members from

Figure 8 Advantech’s co-creation architecture

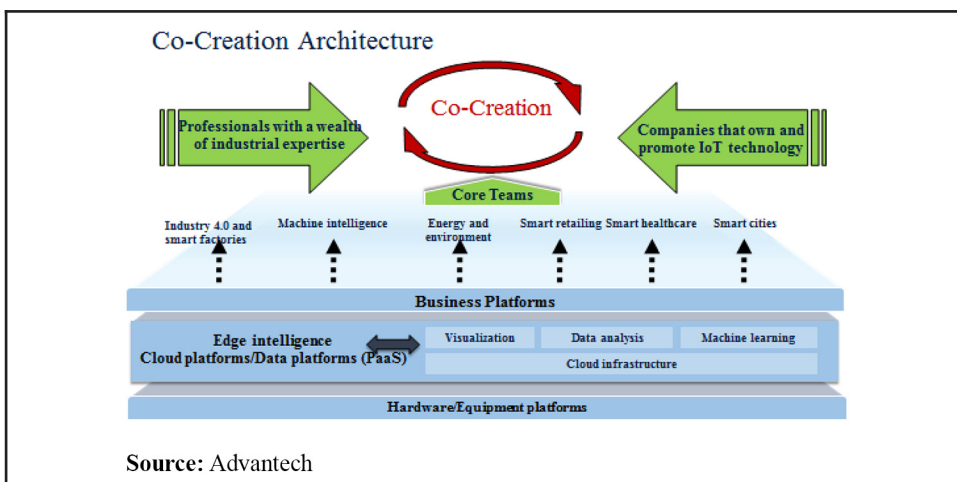
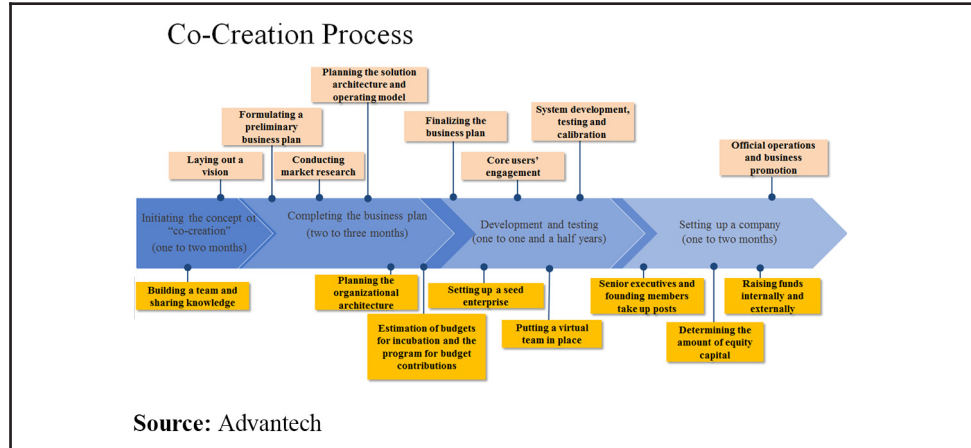


Figure 9 Advantech's co-creation process

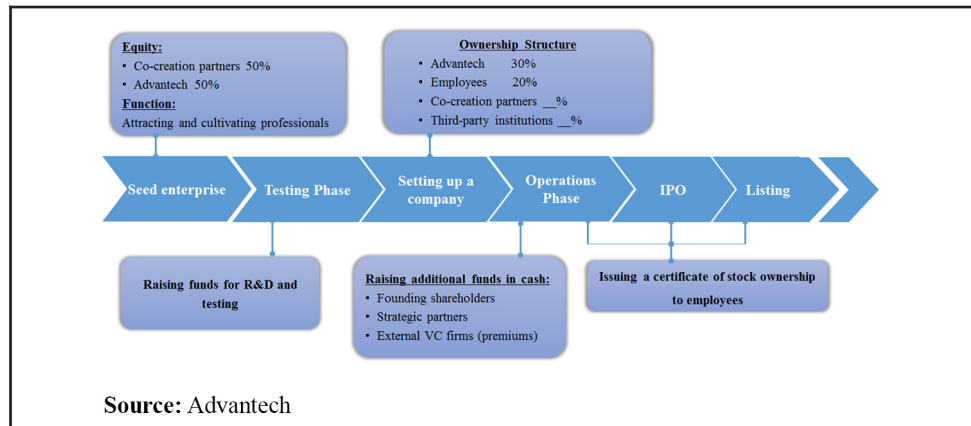


both sides form a virtual team. It remains up to their own employers to pay their salaries. The 'co-creation' effort is co-governed, without a general manager in place in the first year. This move aims to encourage team members to express disparate ideas, instead of following the orders of the general manager only; otherwise, his shortcomings would likely turn out to be a huge drag on the organization. In the very beginning, Advantech and co-creation partners keep close watch on the co-creation team at the beginning. We think co-governance is an ideal strategy for a 'co-creation' effort".

In terms of equity allocation, Advantech and co-creation partners would hold a 50 per cent stake respectively in the stage of initial design. When a co-creation company was formally founded, Advantech would usually hold less than 30 per cent, co-creation partners would hold 30 per cent, and members of the co-creation team would take a 20 per cent stake; the remaining shares, dependent on the projects, were attributable to other partners and stakeholders (e.g. relevant government organs and research institutes) (Figure 10).

Liu thought co-creation, rather than individual entrepreneurship in the internet industry (e.g. Facebook and ele.me born out of college dormitories), was indispensable for the IoT industry in its third stage. He explained, "Based on simple business logic, 'Internet Plus' innovations, such as online vehicle for hire, bike-sharing and online meal-ordering, have departed from traditional models in original industries. In the third stage of the IoT industry,

Figure 10 Advantech's regulation on the co-creation company's equity growth



traditional industries rely on IoT for transformation. These B2B industries are characterized by complicated domain requirements and sophisticated domain technologies, with a need for value-added provided by the platform. Unlike B2C enterprises, B2B companies cannot profit from burning through money or buying online traffic. Co-creation enables traditional industries, technology providers and startup teams to join hands”.

Apart from the co-creation model, Advantech had forged partnerships with customers in segmented markets and vertical industries to establish an IoT ecosystem. On November 6, 2017, Advantech announced its program to set up the Edgex Consortium with Mitsubishi Electric, Omron, NEC Corporation, IBM Japan and Oracle Japan. This organization aimed to promote integration between factory automation and IT, enable edge computing to create new value, and put companies on the fast-track in the era of Industry 4.0 (eeworld.com.cn, 2017). Under this model, Advantech would share with global partners its wealth of cutting-edge technology, superior resources and profound insights, and cooperate with industrial leaders to push forward the co-creation business.

Challenges ahead (2017 forward)

“Over 200 out of our 8,000 employees are engaged in cloud software development. But all executives, including me, focus on IoT,” said Liu. When asked about Advantech’s investment in IoT, he explained, “Our Strategic Investment Department has brought all external investment projects to a halt and outsourced them to investment institutions so as to concentrate on co-creation projects.”

“We planned to roll out ten co-creation projects within two years, but it now seems that we can launch ten more,” declared Liu with excitement. As co-creation projects were implemented in November 2016, hundreds of companies in traditional industries had agreed on over ten co-creation programs with Advantech. In addition, a co-creation project with a sewage treatment plant in Taiwan had been well under way.

Liu was confident about co-creation. He believed the model would enable the company to ride the wave of IoT, towards an IoT future with additional companies. Nevertheless, he still had some worries.

How would Advantech attract excellent companies across industries to join its co-creation platform? Its existing policy permitted the company to team up with only one company in one industry for co-creation. Did this rule deny the company an opportunity for cooperation with even more excellent enterprises and run counter to its fundamental purpose of being an enabler? Co-creation, an emerging partnership model, had yet to stand the test of time. What problems would come up during its implementation in the short and long run? In November 2017, Advantech’s market capitalization hit US\$4.7bn, with a projected full-year operating revenue of US\$1.4bn. However, its recent share prices had plunged by 15 per cent. How would Advantech inject confidence in investors in the absence of short-term gains for co-creation projects?

Looking into the future, would Advantech’s co-creation model bring it new business opportunities in the IoT era? What hidden obstacles were lying in the way? How would the company meet these challenges to facilitate the continuous evolution of its IoT ecosystem?

Keywords:
Strategy,
Strategic management/
planning,
Innovation

Notes

1. The “industrial computer” is often called “industrial control computer”; in this case, “industrial computer” and “industrial control computer” express the same meaning.
2. In 1999, Kevin Ashton, Executive Director of Auto-ID Lab, coined the term “Internet of Things”. Auto-ID Lab is an academic lab that takes a global lead in IoT research. The internet report published in 2005 by the International Telecommunication Union stated that the Internet of Things means a network, in which any object is connected with the Internet through information sensing and transmission equipment, including QR code readers, RFID devices, infrared sensors, Global Positioning System (GPS) and laser scanners, according to the protocols for information exchange

and communication so as to fulfill smart identification, positioning, tracking, monitoring and management.

3. The “Smart Planet” means embedding and equipping sensors into power grids, railways, bridges, tunnels, roads, buildings, water supply systems, dams, oil- gas pipelines and other objects, keeping them interconnected to form the so-called “Internet of Things”, and integrating IoT with the existing Internet to fulfill integration between the human society and cyber-physical systems.
4. Amoeba Management was initiated by Kazuo Inamori, Founder of Kyocera in Japan. Amoeba Management begins with dividing a company into small units like amoebas that reproduce by cell division. Each amoeba formulates its own annual plan, assumes sole responsibility for gains or losses, and makes continuous investments. This model can make the organization more flexible. Amoebas achieve their objectives through the concerted efforts of all members. Each employee plays a role in managing the unit. This move aims to sharpen employees’ sense of participation and full responsibility.
5. DLoG is a Germany-based vehicle-mounted computer manufacturer with cutting-edge technology. Advantech purchased its 100% stake for €12.85 million (USD \$17.3 million), with an aim to reigning supreme in the global industrial vehicle-mounted computer industry.
6. Advantech purchased a 100% stake in UK-based Innocore Gaming for £3.34m (US\$5.4m). Since 2007, Innocore had been committed to designing and producing computer hardware and software required for the gaming industry. The US and European markets accounted for 87% of its sales revenue. The acquisition was aimed at improving Advantech’s ability for development of gaming software.
7. Taiwan-based ACA Digital Corporation specialized in the design and manufacture of industrial portable computers, with a strong ability to integrate wireless transmission devices. Advantech acquired ACA Digital Corporation for TWD NT\$93m (US\$3.1m). The acquisition aimed to make Advantech’s product line for industrial portable computers complete. ACA’s R&D team would help Advantech improve its ability to develop hand-held application computers.
8. “Advantech Plus Technology Campus Put into Operation”, The Associated Press, available at: <http://finance.sina.com.cn/stock/usstock/mtsxz/20140114/110017946677.shtml> (accessed 24 November 2017).
9. The “cloud software” here refers to IoT client software.

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