Turkcell
on the secret of its remarkable growth

Sanlian Hope
Powering smart manufacturing with AI

Building a Fully Connected, Intelligent World
Bring digital to every person, home and organization for a fully connected, intelligent world
Artificial intelligence is a very broad discipline. For many, the main association AI triggers is robots, but it also covers a range of areas. These include machine learning, speech recognition, image recognition, human-machine interaction, brain-computer interfaces, data modeling, and big data analytics.

AI is sparking an industrial revolution that will impact all people and industries, with the first wave of disruptions occurring in the following sectors: (1) transportation, including driverless vehicles and electric cars (2) education, for example, greater personalization and inclusivity (3) healthcare and pharmaceuticals, such as precision medicine, diagnosis, and faster drug development (4) natural language processing, including real-time, multi-language translation, and (5) telecommunications networks, for example, predictive O&M and self-driving networks.

History shows that technological progress is accompanied by gains in simplicity and efficiency. While the principles behind technical innovation are often very complicated, the results are extremely simple. And AI is no exception.

Huawei believes that AI is a collection of technologies. To bring digital to every person, home, and organization for a fully connected, intelligent world, we need to make active changes in three areas: technology, talent, and industry. This is why Huawei released its AI strategy and full-stack, all-scenario AI portfolio at HUAWEI CONNECT in October 2018.

All-scenario refers to deployment environments for public cloud, private cloud, edge computing, IoT industry devices, and consumer devices. Huawei’s full-stack solution includes chips, chip enablement, training and reasoning frameworks, and application enablement, providing a powerful computing and application development platform for AI application developers. Huawei’s solution will allow all industries and businesses to enjoy AI that is affordable, effective, and reliable.

Huawei hopes to work with customers, industry partners, and academia to make AI more inclusive and put it within reach of the masses, jointly promote industry digitalization, and accelerate the arrival of the intelligent world.

We hope to leverage complex technology to make the world simpler, providing customers and society with simple solutions while we handle all the complexity.
Perspectives

01 Building a Fully Connected, Intelligent World

Huawei Rotating Chairman Eric Xu announced Huawei’s AI strategy and its full-stack, all-scenario AI portfolio in his keynote speech at HUAWEI CONNECT 2018, including the company’s Ascend series of AI chips – the world’s first AI IP and chip series designed for a full range of scenarios.

11 Creating the intelligent future

The value of the global AI market will reach US$380 billion by 2025. Ninety percent of this will be generated by the enterprise market, and over the next decade, the home of AI will be industry. Find out how Huawei’s full-stack, all-scenario AI portfolio is designed to meet this burgeoning need.

Voices from Industry

15 Turkcell on the secret of its remarkable growth

Turkcell’s successful approach to digital transformation has consolidated its leading position as a converged operator that offers voice, data, TV, and value-added services to businesses and consumers on integrated fixed and mobile networks. Find out how it has achieved its success.
23 Al is learning. Are we?

There are many roadblocks hindering AI from realizing its potential. One is the skilled AI experts necessary to expedite progress. The founder and CEO of Hang Ten Systems Vishal Sikka looks at the current state of AI and what we need to do to make it flourish.

29 Why you need to be thinking about the DevOps-AI mix

DevOps – a process that combines software development and IT operations – is poised to become a greater catalyst for speed in the field of systems development. CTO and co-founder of DORA Jez Humble shares his thoughts on industry developments.

35 Tao of Business

How big data and AI will transform Shenzhen Airport

When flights are delayed at Shenzhen Airport, more than 8,000 passengers can be stuck waiting at the same time. So how did the airport respond?

39 Yunlu Technology: Making construction safe with AI

43 Shenzhen Traffic Police cuts fatalities and boosts enforcement with intelligence

Winners

45 Activating Intelligence: Smart cities and smart agriculture

50 El Corte Inglés S.A.: Rejuvenating a 100-year-old retail giant with technology

53 Telenor: Connecting customers to what matters most
Providing pervasive intelligence for a Fully Connected, Intelligent World

Huawei Rotating Chairman Eric Xu announced Huawei’s AI strategy and its full-stack, all-scenario AI portfolio in his keynote speech at HUAWEI CONNECT 2018. He also announced the release of the company’s Ascend series of AI chips – the world’s first AI IP and chip series designed for a full range of scenarios.

By Eric Xu, Huawei Rotating Chairman

Below is the full text of Xu’s keynote speech:

**AI is the overall outcome of 60 years of development in ICT**

In 1956, the concept of artificial intelligence was proposed at the Dartmouth Workshop organized by John McCarthy, an assistant professor of mathematics at Dartmouth College. That was more than 60 years ago. Since that time, we’ve seen two AI winters, when funding and interest in AI research reduced sharply. Despite these setbacks, AI has never stopped advancing.

In 1971, Intel introduced the first microprocessor. That was almost 50 years ago, and Moore’s law has continued to hold true throughout the robust development of the ICT industry.

If we overlay graphs of AI and ICT development
cycles over the past 60 years, it’s clear that advances in AI and ICT are closely related. Academic research findings and engineering advances go hand in hand.

In the past, we went through two AI winters because expectations for AI were way beyond the engineering capacity of the ICT industry at the time. The good news is that each winter eventually gave way to spring, marking a new beginning for AI.

Today, we again find ourselves in a season of harvest, one made possible through six decades of commitment and collaboration between academic and industry stakeholders in ICT domains.

Moving forward, we need to make full use of AI technology. We need to start reaping the benefits sooner rather than later, and work hard to expand its value. We have to do what we can to extend this harvest season. Let’s plant AI along the equator, so to speak, to create an environment where it can continue to blossom and thrive.

**AI is a new general purpose technology**

We can’t fully unleash the value of a technology unless we properly define its positioning. This is essential for us to truly understand and adopt AI technology.

At Huawei we recognize AI as a combination of technologies that, together, form a new general purpose technology (GPT). We have seen the rise of many general purpose technologies before AI. The wheel and the iron, which are both several thousand years old. Railways and electricity in the 19th century. And automobiles, computers, and the Internet in the 20th century.

In *Economic Transformations: General Purpose Technologies and Long-Term Economic Growth*, the Canadian academic Richard G. Lipsey noted that new GPTs are the drivers of sustainable socioeconomic growth. A GPT must have multiple uses across the economy, according to Lipsey, and have many technological complementarities, meaning when two or
more different technologies strengthen and reinforce each other, and spillovers.

Economists have observed that, throughout human history, there have been 26 technologies that can be classified as true GPTs. AI is one of them.

By emphasizing AI’s role as a general purpose technology, my goal is to call your attention to how influential and valuable AI is to our future. As a GPT, AI will help us find more efficient solutions to problems we already know how to fix. It will also help us address problems that, to date, have remained unsolved.

As companies, if we want to stay ahead we need to adopt an AI mindset – use AI concepts and technologies to tackle both existing and future problems.

Inside Huawei, our experience shows that AI can replace humans in certain tasks, and also automate cost reduction throughout production cycles. This is the most valuable characteristic of AI, and what sets it apart from run-of-the-mill informatization, which can’t automatically reduce production costs.

**AI will trigger change in all industries**

AI will change all industries. We need to ask, “How will AI reshape or even disrupt the industry I’m working in?” Going forward, we need to think of new ways to prepare our businesses and industries for change.

There are clear signs that AI will change or disrupt a whole host of industries:
- Intelligent transportation will make traffic way more efficient.
- Autonomous driving and electric cars will bring dramatic changes to the automotive industry.
- Personalized education will deliver efficiency gains for both teachers and students.
- In healthcare, early prevention and precision treatment have the potential to increase life expectancy.
- Precision drug trials will cut the cost and time of discovering new medicine.
- With real-time translation across multiple languages, communication will be easier than ever before.
- Telecom network O&M will become more efficient.

The list goes on and on.

In just the past year since we launched Huawei Cloud EI and HiAI, we’ve already seen AI drive unprecedented momentum across all kinds of industries.

**AI will also change every organization**
We’ve seen several technological revolutions since the 18th century. Each has had a huge impact on organizational structures, processes, and workforce skills. But AI will change jobs and skills in a way that’s quite different from the previous revolutions.

Previous revolutions led to huge demand for repetitive routine tasks, such as operating equipment in textile mills, and running car and phone assembly lines. AI will greatly boost automation in almost all aspects of an organization. This means there will be much less demand for jobs that handle repetitive, routine tasks.

Demand for data science jobs will keep rising, including those for data scientists and data science engineers with basic know-how in data science. The total number of these jobs will be much smaller than the number of jobs that handle repetitive, routine tasks.

It’s likely that organizations will become more diamond-shaped, with AI systems taking the place of the people at the bottom, where they handle huge volumes of repetitive and routine tasks.

AI-triggered change has just begun. Finding the right problem is more important than devising a novel solution.

Change can mean good news for some and bad news for others, especially when the changes first start to emerge.

Some people might get excited about the new, once-unimaginable functions that AI will make possible. These people will feel a strong urge to drive large-scale AI adoption. And there will also be those who feel anxious about underperforming AI projects, or who worry about the reliability and security of AI applications. These are the ones who will remain uncertain about how to best use AI in the future.

If we look at the history of all GPTs, these reactions to AI are all very natural.

There are four different phases along the AI productivity/adoption curve. We have just left the
first phase, where exploration of AI technology and application takes place on a small scale.

Now we’re in the second phase, where new technology and society are colliding. From a tech perspective, more issues are emerging as AI technology continues to advance. If we look at things from an application perspective, however, the value of AI is seeing greater recognition as it comes into wider use.

That said, existing policies, corporate processes, and workforces are built around older technologies, such as those in the information and Internet eras. The broader social environment isn’t yet ready for the AI era. So in this phase we see a certain degree of collision – even conflict – between tech development and society.

However, AI will ultimately find itself in a social environment that’s more conducive to its development and application. When that happens, we will step into the third phase, where we’ll see rapid, comprehensive advances in AI adoption and productivity.

The fourth phase will be the golden era of AI, where humanity will benefit from a constant stream of new advances in technology until a new GPT emerges. Nevertheless, it’s important to keep in mind that AI isn’t a cure-all. No technology can solve every problem. We need to focus on areas where AI can create the most value, not on problems that AI isn’t equipped to solve. Finding the right problem is more important than devising a novel solution.

Inspiring gaps

To get started, we need to take a look at where we are today with AI.

The world has seen significant achievements:
- In 2017, 20,000 papers on machine learning were published.
- More than 22 countries have announced a national AI plan.
- In 2017, there were more than 1,100 new AI startups.
- VC investment in AI reached US$14 billion in the same year.

Despite these incredible achievements, we’ve also seen quite a few smaller figures that speak to lukewarm AI adoption in its early stages. For example:
- Only 4 percent of enterprises have invested in or deployed AI.
- Only about 2 percent of retailers have invested in or deployed AI.
- About 5 percent of smart city implementations are using AI.
In 2017, roughly 10 percent of smartphones on the market were equipped with AI capabilities. The supply and demand ratio of AI talent worldwide is just 1 percent.

The gaps between stellar achievements and lukewarm adoption are the driving forces that will push the industry forward. I find these gaps to be very inspiring.

**Ten changes that will shape the future**

To close these gaps, we need the right technology, the right talent, and the right industry ecosystem. Next, I’d like to discuss ten important changes that we have to work on together across all three of these elements.

First, we need to increase the speed of model training.

With existing technology, training more complex models often takes days, if not months. Successful innovation only happens after several rounds of iteration. Slow model training seriously impedes application innovation. We believe that training should be completed in minutes or even seconds.

The second change is related to the availability and cost of computing power.

Computing power is the foundation of AI. Right now, it’s a costly and scarce resource. While growth in computing power has been a major driver behind progress in AI, a lack of readily available and affordable computing power is becoming a constraint that holds back broad-scale AI adoption.

We need to provide more abundant and affordable computing power in the future. We should take action now to meet this demand.

The third change involves AI deployment.

Hybrid clouds have become a major cloud service model for enterprise use. Right now, AI is deployed mostly in the cloud, with only a small portion at the edge. AI hasn’t yet been closely integrated into business environments.

Al should be pervasive. Furthermore, it should be adaptable to all scenarios, and in all cases, user privacy must be respected and protected.

The fourth change involves the efficiency and security of algorithms.

Algorithms are another driver behind AI development. The majority of the basic algorithms we use today were invented before the 1980s. As AI comes into wider use, the weaknesses of existing algorithms are becoming more apparent.

Algorithms of the future should be data-efficient. That means they can deliver the same results with less data. Future algorithms should also be energy-efficient, producing the same results with less compute and less energy. Algorithms must be secure and explainable. Algorithms like these will set the stage for wide-scale AI development.

The fifth change involves AI automation.

At present, AI projects are labor-intensive, especially during the data labeling process. This requires so much labor, in fact, that specialized “data labeler” jobs have begun to emerge. There’s even a running joke in the industry: “no labor, no intelligence”.

Moving forward, we must greatly increase AI automation to achieve automated or semi-automated operations, especially during processes like data labeling, data collection, feature extraction, model design, and training.

The sixth change is about the practical application of AI.
In June 2018, Benjamin Recht, an associate professor at UC Berkeley, released a paper with a perplexing title: “Do CIFAR-10 Classifiers Generalize to CIFAR-10?” According to the paper, models that perform with high accuracy in one test set of CIFAR-10 classifiers are 5 percent to 15 percent less accurate in another test set that closely resembles CIFAR-10, which Recht himself developed. This means a large drop in the practical application of a given model.

It’s clear that many high-performing models and algorithms perform better in tests than in real-world execution.

Industrial-grade AI models of the future must be able to meet the needs of real-world execution. It’s not enough to perform well in test sets alone.

The seventh change involves model updates.

The accuracy of any given model shouldn’t be static, as accuracy changes with data distribution, application environments, and hardware environments. Keeping accuracy numbers within an acceptable scope is necessary for enterprise applications. Existing model updates, however, are not done in real time. They rely on human input at fixed intervals. It’s a semi-open loop system.

We believe that the models of the future need to be adaptive to changes and updated in real time. This represents a real-time, closed-loop system that helps enterprise AI applications continue to operate in an optimal state.

The eighth change involves synergy between AI and other technologies.

Every GPT delivers maximum economic value only when it’s combined with other technologies. AI is no exception. But current discussions on AI more often than not focus entirely on AI, with no mention of other technologies.

In the future, we need to promote greater synergy between AI and other technologies, including cloud, IoT, edge computing, Blockchain, big data, and databases. This is the only way to fully unleash the value of AI.

The ninth change is about platform support.

At present, AI is a job that can only be done by highly skilled experts. There aren’t enough mature, stable, and extensive automation tools. Producing AI models is complex work that takes a lot of time and effort.

Moving forward, we need a one-stop platform that
provides the necessary automation tools, making it easier and faster to develop AI applications. When this platform is in place, AI will become a basic skill of all application developers, even all ICT workers.

The last change is about talent availability.

Lack of AI talent, especially data scientists, has long been seen as a major obstacle to AI progress. Data scientists are scarce and will remain so in the future. Addressing this challenge requires an AI mindset. That means providing intelligent, automated, and easy-to-use AI platforms, tools, services, and training and education programs to foster a huge number of data science engineers. These people must be equipped with the ability to deal with massive volumes of basic data science tasks.

The AI workforce will be organized in a pyramid-like structure, with a large number of data science engineers working with data scientists and subject matter experts. This is how we can help resolve the scarcity of AI talent.

These ten changes don’t represent the full picture of AI technology, talent, and industry development. But if we can drive these changes, they will lay a solid foundation for future AI growth.

**Huawei’s AI strategy**

These ten changes are what Huawei expects to see in the AI industry. They are also the inspiration behind Huawei’s AI strategy.

To drive these ten changes, our AI strategy includes the following five priorities:

**Invest in AI research**: Develop basic capabilities in data and power-efficiency, for example, using less data, computing resources, and power; build secure and trusted platforms; and develop automated and autonomous machine learning for computer vision, natural language processing, decision and inference, and so on.

**Build a full-stack AI portfolio**:
- Deliver abundant and affordable computing power.
Backed by our AI portfolio, Huawei Cloud EI will be able to deliver a full-stack portfolio for enterprise and government customers.

- Provide an efficient and easy-to-use AI platform with full-pipeline services.
- Make the portfolio adaptive to all scenarios, both standalone and cooperative scenarios between cloud, edge, and device.

**Develop an open ecosystem and talent:** Collaborate widely with global academia, industries, and partners.

**Strengthen our existing portfolio:** Bring an AI mindset and techniques into existing products and solutions to create greater value and enhance competitive strengths.

**Drive operational efficiency at Huawei:** Apply AI to massive volumes of routine business activities for better efficiency and quality.

**Huawei’s full-stack, all-scenario AI portfolio**

By “all-scenario”, we mean different deployment scenarios for AI, including public clouds, private clouds, edge computing in all forms, industrial IoT devices, and consumer devices.

“Full stack” is about the functionality of our technology. Our full-stack portfolio includes chips, chip enablement, a training and inference framework, and application enablement.

Specifically, our full-stack portfolio includes the following:

- **Ascend:** An AI IP and chip series based on a unified, scalable architecture. In this series, we have Ascend Max, Mini, Lite, Tiny, and Nano. Ascend 910 has the world’s greatest computing density in a single chip. Ascend 310 is the most efficient AI SoC for low-power computing.

- **CANN (Compute Architecture for Neural Networks):** A chip operators library and highly automated operators development toolkit

- **MindSpore:** A unified training and inference framework for device, edge, and cloud (both standalone and cooperative)

- **Application enablement:** Full-pipeline services (ModelArts), hierarchical APIs, and pre-integrated solutions

In September 2017, we released Huawei Cloud EI, an AI service platform for enterprises and governments.
In April 2018, Huawei announced HiAI, our AI engine for smart devices.

Our full-stack, all-scenario AI portfolio is designed to provide powerful support for Huawei Cloud EI and HiAI.

Backed by our AI portfolio, Huawei Cloud EI will be able to deliver a full-stack portfolio for enterprise and government customers, and HiAI will provide a full-stack portfolio for smart devices. HiAI services are deployed on Huawei Cloud EI.

• To sum up, our AI strategy is to invest in basic research and talent development, build a full-stack, all-scenario AI portfolio, and foster an open global ecosystem.

• Within Huawei, we will continue to explore to improve management and efficiency with AI.

• In the telecom sector, we aim to adopt SoftCOM AI to make network O&M more efficient.

• In the consumer market, HiAI will infuse intelligence into consumer devices, making them smarter than ever.

• Huawei Cloud EI public cloud services and FusionMind private cloud solutions will provide abundant and affordable computing power for all organizations – especially businesses and governments – and help them use AI with greater ease.

• Our portfolio will also include AI acceleration card, AI server, AI appliance, and many other products.

“All-scenario” means that Huawei is able to deliver pervasive intelligence for a fully connected, intelligent world.

“Full stack” means that Huawei is able to provide AI application developers with unparalleled computing power and a strong application development platform. We are working towards making AI more inclusive – making it affordable, effective, and reliable for all. And we have what it takes to make that happen.

I hope we can all work together to turn AI into a practical reality, making it inclusive and available for all. Huawei is committed to working closely with our customers, partners, and academia to grow together, promote pervasive AI, and ultimately build a fully connected, intelligent world.
Creating the intelligent future

Imagining the future is the job of science fiction. Building it depends on technology. Huawei has released a full-stack, all-scenario artificial intelligence (AI) solution with the aim of bringing intelligence everywhere— to every person, every home, and every organization. According to Huawei’s projections, the global AI market is set to reach US$380 billion by 2025. Ninety percent of this will be generated by the enterprise market. Over the next decade, the home of AI will be industry.

By William Xu, Huawei Director, Chief Strategy Marketing Officer

Three key points to understanding industry AI

First, scenarios are the starting point. We often ask what AI can do. But we should be asking: What do we want it to do? What problems do we want it to solve? And how can we use AI to achieve it?

Second, industry wisdom is the breakthrough point. As the saying goes, “old horses know the way”. In industry, the “old horse” is expert wisdom. We need to transform the experience of these “old industry horses” into AI skills.

Third, value is the return point. AI applications create business value, industry value and social value. At the same time, value-based
implementation can produce supplementary data, making AI smarter.

Three scenarios where industry AI comes into play

Scenario 1: bulk repetitive tasks. Examples of this are image identification and document review — bulk repetitive tasks with clearly defined goals. The core value of AI applications in this type of scenario is increased efficiency.

Scenario 2: expert experience. Many industries lack key experts. China’s healthcare sector, for example, has fewer than 5,000 specialists able to screen for cervical cancer and to screen every woman of the right age in China would 20 years. But with AI assistance, it’s possible to quickly screen 80 percent of women with health checkups as well as 99 percent of those at risk of cervical lesions. This is a boost in efficiency of 5 to 10 times.

Scenario 3: multi-domain collaboration. This is the most complex type of scenario, and includes urban intelligent transportation systems and modern manufacturing. Traffic light signal control, for example, must consider multiple variables, including time, weather, lanes, road network, and major events. The analysis and decision-making required is clearly beyond the human brain.

Huawei announces its full-stack, all-scenario AI solution

Huawei’s all-scenario solution includes high-performance public and private cloud AI chips that deliver 256T FLOPS of computing power, twice the industry average. They can be applied in edge computing solutions, for example, cameras and PCs; embedded in smartphones; and deliver ultra-low power consumption, including 1 MW Bluetooth headsets. It’s the only all-scenario solution covering high-, medium-, and low-power scenarios and a compute power in the range of tens of millions.

Huawei’s original Da Vinci architecture is unified and enables all-scenario application. Requiring one-time development, it’s suitable for deployment, migration, and collaboration in any scenario.

According to Huawei’s projections, the global AI market is set to reach US$380 billion by 2025. Ninety percent of this will be generated by the enterprise market. Over the next decade, the home of AI will be industry.
Shenzhen Airport implemented “+ AI” and smartified its infrastructure. Thanks to this, the contact stand rate has increased to 80 percent. This 10-point increase represents 4 million less people a year needing to take a shuttle to a remote gate.

**Airport + AI: Facial recognition and improved contact stand rates**

Shenzhen Airport has over 1,000 arrivals and departures every day. Its contact stand rate is approximately 70 percent, with a target is 80 percent, and daily passenger traffic is 120,000.

Shenzhen Airport implemented “+ AI” and smartified its infrastructure, moving from the traditional manual planning method using GNATT charts to AI automation. Thanks to this, the contact stand rate has increased to 80 percent. This 10-point increase represents 4 million less people a year needing to take a shuttle to a remote gate.

The project also included facial recognition to allow for one-stop airport clearance, reducing passenger queue time by 15 percent.

**Traffic + AI: From cars watching the lights to lights watching the cars**
Shenzhen has the highest vehicle density in any city in China, with 510 vehicles per kilometer. Covering an area of 1.5 square kilometers, Huawei’s Shenzhen headquarters sees over 10,000 vehicles access the site every day.

Since June 2018, Shenzhen Traffic Police has deployed AI technology supported by Huawei Cloud at nine intersections in Bantian to implement real-time adjustment of traffic light control strategies based on traffic congestion. In the past cars watched the lights, but now it’s the lights watching the cars. As a result of the project, average speeds have increased by 15 percent, saving ten minutes.

Platform + AI + ecosystem: Accelerating the intelligent world

AI is dependent on connectivity. As a platform company, Huawei enables industries to transform digitally through “cloud, pipe, device” based platforms, AI, and working with ecosystem partners.

Huawei advocates platform + AI + ecosystem. Technology leadership is the foundation of the platform. With its superior ICT technology, Huawei continues to expand its technical capabilities in AI and maintain its lead. Second, the platform must remain open. Third, the platform must be fair. Huawei and ecosystem partners will jointly build an ecosystem based on fair, win-win, cooperative relationships. Huawei also plans to develop 1 million AI developers and partners over three years.

In the digital economy, ICT is a basic technology, and AI is considered one of 26 general-purpose technologies (GPT) in history. AI has become an enabler for industries that’s driving industry digitalization. ICT’s horizontal model and vertical industries require deep collaboration with others.

Huawei held a Global Industry Organizations (GIO) Roundtable in Shanghai with 16 global standards organizations, industry organizations, and open source organizations. They decided to collaborate to jointly promote industry digital transformation and speed up the arrival of the intelligent world.
Turkcell on the secret of its remarkable growth

Turkcell’s successful approach to digital transformation has consolidated its leading position as a converged operator that offers voice, data, TV, and value-added services to businesses and consumers on integrated fixed and mobile networks. With 50.3 million subscribers globally, Turkcell’s Chairman Ahmet Akca explains the business and technology strategies that underpin its remarkable growth and market leadership.

WinWin: What’s the secret to Turkcell’s success in digital transformation?

The data revolution has created a market value of trillions of dollars. However, operators need to do more than just carry data. In the last 10 years, OTT companies have used telecom infrastructure to reach billions of users and create a trillion-dollar economy. During this time, I think that telcos have missed a very important opportunity and need a change in mindset to compete with global OTT service providers.

Turkcell knew it could no longer act as a raw data handler. We had to transform into a processed data services provider to compete and succeed. In particular, legally licensed operators are far more reliable than global companies at protecting customer information,
Turkcell knew it could no longer act as a raw data handler. We had to transform into a processed data services provider to compete and succeed.

— Ahmet Akca, Turkcell’s Chairman
The real convergence Turkcell initiated was not the convergence of fixed and mobile networks; it was OTT services and infrastructure. This has paid off and Turkcell has become the fastest growing operator in the world in the last two years.

which can provide opportunities for operators in the near future. Operators need to anticipate this change and reinvent themselves. And that’s exactly what we’ve done over the last three years.

We transformed our company into the world’s first real digital operator. Turkcell moved from selling gigabytes to providing real digital services that touch customers’ daily lives.

The real convergence Turkcell initiated was not the convergence of fixed and mobile networks; it was OTT services and infrastructure. This has paid off and Turkcell has become the fastest growing operator in the world in the last two years.

The basis of our transformation is data, which is today’s oil. Producing data alone is not enough. What is important is to process that data, keep it within the borders of our country, and ensure its security. Driven by this vision, we opened a new data center in İzmir in June, making Turkcell Turkey’s largest data center and cloud services provider and cementing Turkey’s goal to evolve into a global hub for data centers in the region.

Turkcell has invested over 615 million Turkish lira (US$108.85 million) in next-generation data centers to date, which will increase to 2 billion Turkish lira with the completion of the Ankara and Corlu data centers. For the security of our customers’ personal data and digital services, we’ve also constructed the Turkcell Security Center and Cyber Security Center.

Turkcell has been on an exciting journey of transformation towards becoming a global digital services and content provider. Half of our subscribers use our digital services, and we run very strong digital brands that locally are outcompeting global tech brands; for example, BiP is rivaling WhatsApp, and more people use our music streaming platform fizy than Spotify.

Our Turkish language search engine app Yaani has been downloaded on more than 6.5 million devices. Introduced in October 2017, Yaani was downloaded more than 1 million times in the first 9 days of its launch. We plan to continue developing strong digital products by analyzing data and transforming it into services such as music, cloud, and TV.

WinWin: How do you plan to contribute to Turkey industrial development?
Turkcell is involved in the domestic car industry’s software development and high-tech systems for scenarios such as a connected car platform, entertainment services, digital services, cloud solutions, and big data analytics.

We’ve also deployed solutions to create digital hospitals in several cities in Turkey, digitalizing every process with the help of an Information Management System that lets complete patients’ datasets be monitored on mobile devices. With the kiosks we installed in these hospitals, it’s now far easier to get queue numbers and access test results. Digital infrastructure enables medical devices to send data on networks and sensors and doctors to access X-rays, reports, and blood tests in a paper-free environment. Thus, our hospitals are now world-leading digital hospitals.

To bring value to the healthcare and IT industries with various projects, we’re working with Huawei on several potential projects, including telemedicine for rural communities and support for clinical decisions.

We’re ready to support the digital transformation of Turkey and thus continue to contribute to the digital integration of various vertical industries from health to transportation and beyond.

WinWin: How are current domestic economic conditions, for example, a weakened lira, impacting Turkcell?

I believe we will come out of these difficult times since the Turkish economy is basically strong and we have very strong fiscal discipline. Turkey will continue its growth momentum thanks to our vibrant economy and young population. Macroeconomic indicators are currently in a comfortable zone; for example, the export-import coverage ratio soared to 70.1 percent in July 2018, up from 58.7 percent in the same month last year. Turkey is also performing well when it comes public, personal, and banks and private sector debts.

We believe that Turkey’s growth will come from the digital economy. The prudent macro measures taken by our government will help ensure the development of a healthy and strong technology ecosystem, which will be crucial as we join forces to create the digital economy.

Turkcell will continue to invest heavily in Turkey’s local resources and in creating the digital solutions Turkey needs.
Sanlian Hope
Powering smart manufacturing with AI

Sanlian Hope develops technology and equipment for the production of synthetic fiber and its raw materials to other manufacturers in China. Alongside a digital data-driven platform designed to converge its finances, technologies, and data, the company’s Director and Investment General Manager Zhang Minzhe believes that AI technology, powered by Huawei Cloud, brings production flexibility and will accelerate the company’s shift to smart manufacturing.

By Xu Shenglan, Xue Hua

New opportunities

As a branch of the textile industry, synthetic fibers are perhaps more prevalent than we think, as the natural fiber content in most silk and cotton products is actually very low. “That’s because natural fiber has been impacted by the increase in the area of cultivated land,” explains Zhang. “Output is low and the production methods are highly polluting. Synthetic fiber offers advantages in these two regards, which is why demand has increased.”

The US company DuPont invented synthetic fiber in the 1930s. From its origins, the burgeoning industry soon made its way to Europe for production, before setting sail for Japan and then Taiwan. With its complete supply chain, Taiwan soon emerged as the global heavyweight in the
Natural fiber has been impacted by the increase in the area of cultivated land. Output is low and the production methods are highly polluting. Synthetic fiber offers advantages in these two regards, which is why demand has increased.

— Zhang Minzhe, Director and investment GM of Sanlian Hope
Healthy growth and world-class competitiveness in supply and demand will encourage integrated solutions.

Intelligence means flexibility

While Sanlian benefits from a very high standard of core technology that boosts production efficiency for its customers, entry barriers to the industrial Internet are very high, requiring a deep understanding of the technologies and business models that power the industry. Zhang believes that, “Correctly understanding a customer’s correct requirements is actually more difficult than meeting those requirements later on.”

He goes on to say that, “Huawei may face this confusion when it enters this industry, because customer requirements are random. Order is disrupted. And there’s no differentiation in difficulty. Moreover, most customers don’t know how to utilize data to tell you what you need to do to help, or what they need to provide.” This, Zhang adds, causes a huge waste of resources.

So, what’s the answer? “I believe that cooperating with an engineering technology service company, such as Sanlian Hope, is a good decision,” he says. “We own synthetic fiber technology and power production lines. We serve customers at all levels of the industry and have real service capabilities that can help Huawei respond to different customers. As such, Huawei only needs to build a good platform and provide a universal solution. It won’t need to be directly entrenched in the enterprise. So it’s a good decision to work with Sanlian Hope.”

He’s positive about Huawei’s focus on developing a healthy ecosystem based on infrastructure, rather than trying to occupy all links in the value chain, and also supports Huawei’s pledge not to commercialize customers’ business data. “Our service is provided on the premise that we ensure the security of...
all channels, enabling efficient production for our customers and information security for upstream and downstream players,” says Zhang.

**AI in action**

Huawei’s full-stack, all-scenario AI solution supports IoT and AI technologies in both hardware and software. That, Zhang believes, makes Huawei an excellent system integration partner. Sanlian Hope has installed Huawei’s AI-powered chip in its control systems, “Huawei has helped us quickly realize digital and intelligent transformation.”

**Partnerships for E2E success**

Huawei’s many suppliers and system integrator partners add to its pull. In Zhang’s words, “This gives us the chance to find technology partners to help the synthetic fiber industry solve the problem of digital transformation. We’re enjoying excellent collaboration with Huawei Cloud and the Enterprise EI team.”

When working with system integrators, Sanlian Hope has found that one key problem is the lack of production-related data that’s ready for data analysis – an issue that plagues manufacturing as a whole, and one that requires partners to quickly and efficiently work together to adapt data.

Sanlian Hope expectations of Huawei is that it delivers industry insights. In turn, Sanlian Hope needs to change how it expects to add value from data, adjust the way its control systems collects data, and maximize the value of analytics – changes that it’s already making.

According to Zhang, “Because we’re in process-based manufacturing and the production lines are automated, we tend to receive high-quality data. So we can really extract value and increase production capacity.” Previously, manufacturing was all about Six Sigma and process optimization. “But by bringing data into it, we’re able to use accurate data to identify different situations in large-scale production and adjust production. This kind of flexibility can’t be matched by humans.”

In data collection, dimensions and frequency are crucial. Machine data collection can be performed at a frequency of seconds or milliseconds, compared with the metrics of human data collection whereby a scale of minutes is considered to be very good. According to Zhang, “Aside from dimensions, an explosive increase in frequency allows for real-time, more precise, and more flexible control. This is what we want to achieve with Huawei. And we hope to promote the results of our cooperation in the industry.”

**Intelligence means progress**

In China’s synthetic fiber industry, production capacity has increased from 5 million tons in 2000 to 40 million tons today.

“In the new era, digitalization and intelligence will help us utilize the experience of the industry. It will bring huge opportunities for development, and play a very important role in taking us into the future,” says Zhang.

In the past, the synthetic fiber industry’s unified standards system developed as far as it could go. Looking to the future, requirements will only become more segmented and complex. How do we face these changes? Personalized and small-batch production runs coupled with digitalization and intelligence are ways of increasing flexibility, so that different situations can be categorized and production plans formulated.

“When responding to the needs of the more complex and more varied requirements of downstream industries in the future,” says Zhang, “We need to be prepared to provide support using technological approaches such as AI.”
AI is learning. Are we?

As a field of study, AI has been around since 1956. In the last few years, important breakthroughs have been made in the ability of machines to perform tasks that typically require human-like understanding. However, there are many roadblocks hindering AI from realizing its potential. One is the skilled AI experts necessary to expedite progress.

By Chris Pereira, Linda Xu

With the computing power of machines increasing exponentially and staggering amounts of data available, AI is on the brink of revolutionizing various industries and the way we live our lives.

Globally, the majority of firms believe that having an organizational model that supports AI-driven analytics is critical to breaking down the silos of customer knowledge that exist throughout organizations. The trend is clear: our world is becoming increasingly connected and intelligent.

Echoing that vision, the founder and CEO of Hang Ten Systems Vishal Sikka is looking forward to a future filled with AI applications, systems, and analytics. He expects that the current wave of AI will “produce a tremendous number of applications and have a huge impact.” While
A rethinking of education is necessary to bridge the talent gap in AI, make AI applications available to the masses, and ensure that the development of the technology remains safe.

— Vishal Sikka, the founder and CEO of Hang Ten Systems
he’s certain that the current hype cycle will die and “make way for a more thoughtful, broader approach,” he emphasizes that a rethinking of education is necessary to bridge the talent gap in AI, make AI applications available to the masses, and ensure that the development of the technology remains safe.

New advances in AI

The combination of multiple advances has led to a set of significant breakthroughs in AI. “Huawei and others are building their own AI processors and many startups are as well, and all this is becoming available in cloud platforms,” says Sikka. “A lot of incremental advances are happening in the core software technologies that sit on top of this infrastructure, which are still in the early stages of maturity. And this will of course continue.”

In basic sensory processing and perceptual tasks like image recognition, speech recognition, and language processing, AI already outperforms humans. Intelligent systems can now identify cancer cells from medical scans at a higher rate of accuracy than humans, and machines can translate language, identify images, and classify documents at rates and accuracies on par with humans.

Tractica forecasts that the revenue generated from the direct and indirect application of AI software globally will grow from US$643.7 million in 2016 to US$36.8 billion by 2025, creating a CAGR of 56.8 percent. Underpinning this growth, Sikka adds, is “a dramatic improvement in computing power, and the availability of massive data sets.”

If you look at identifying radiology scans or large-scale facial recognition, for example, these are all better than human capabilities already. Out of the top 10 use cases, 60 percent are related to big data and 40 percent are related to image or object recognition. The core strengths of AI capabilities right now are clearly focused in these areas.

“My sense is that there are going to be three different fronts of development,” says Sikka. One such front is likely to be in building applications for these technologies, creating huge opportunities in bringing various applications in different domains to businesses and consumers. However, states Sikka, “We’re still in very early days on this front. That is going to be one big thing that will happen in the next 5 to 10 years. We’ll see applications in all kinds of areas, creating application-oriented breakthroughs,” added Sikka.

Gearing up for AI
It’s simple classification.”

The combination of the full stack is a powerful way to help enterprises embrace AI, but there’s still much work to do. For example, while AI systems are doing incredible things, we’re not quite sure how they’re doing it. AI engineers aren’t yet able to articulate the behavior and machines aren’t truly reasoning or processing information like a human does.

Several key breakthroughs still need to happen before...

We’re not even close to the kind of intelligence that even children have. AI is getting really good at perceptual tasks, like recognizing images. But that ability is very superficial. The ability of AI, or a deep neural network, to distinguish a dog from a picture of a dog or from a metal dog, is very superficial.

In fact, though, AI isn’t anywhere close to being able to replace humans, Sikka explains, “We’re not even close to the kind of intelligence that even children have. AI is getting really good at perceptual tasks, like recognizing images. But that ability is very superficial. The ability of AI, or a deep neural network, to distinguish a dog from a picture of a dog or from a metal dog, is very superficial.

Given all these advances, it almost seems like we should start becoming concerned about the future of work – should people worry about machines taking their jobs?
we get to Artificial General Intelligence whereby AI is able to perform tasks with human-level intelligence – if we ever achieve it. The road ahead is still long and hard.

However, as the underlying technology develops over the next few decades, further breakthroughs can and will be incorporated into AI solutions. Of course, some great applications are already possible across industries. The focus of the industry in the near future is about identifying these applications and building them up in a very robust and focused way so that enterprises can rely on and trust these applications.

Open-source AI

“When we build enterprise AI for enterprise applications, we have to keep the drawbacks in mind,” said Sikka. “That’s why I’m very excited that Huawei has unveiled its AI strategy, starting from the chip, all the way to the solutions and several layers in between. The native AI processor, the programming model, MindSpore framework, and developer platform.”

Huawei recently rolled out a set of open-source AI development tools on its cloud service platform, aiming to help developers and engineers simplify the AI workflow from training machine learning models to deployment on local devices. For example, Huawei’s new ML framework, MindSpore provides device-edge-cloud training and inferencing based on a unified distributed architecture for machine learning, deep learning, and reinforcement learning. It also supports models trained on other frameworks.

The ability to deliver applications to enterprises using full-stack solutions like Huawei’s is a direction of focus for many in the AI field. And while impressive things are happening in the field of AI, there are numerous bottlenecks still to overcome. “If you look at the way our brains are constructed, they’re highly resilient. We’re much more than fraud identification machines or obstacle detection and avoidance machines,” says Sikka. “I can have this conversation with you while also driving a car and thinking about what I have to do next and whether I’m feeling thirsty or not, and so forth.” To give machines these abilities will require certain breakthroughs that still haven’t happened. Sikka believes that the state of AI today is such that there’s a gold rush around a particular set of techniques. “We need to develop some of the more broad-based, more general techniques as well, which bring in reasoning, articulation, and other capabilities,” he says.
There’s just a massive amount of hype, myth, and noise around AI. We need to broaden the base, to bring the awareness of AI and the awareness of technology to large numbers of people. This is a problem of scaling the educational infrastructure.

Education is lagging behind AI’s development

The development of AI is asymmetric. A few companies have disproportionate access to data and to the AI experts, a point with which Sikka agrees, “There’s just a massive amount of hype, myth, and noise around AI. We need to broaden the base, to bring the awareness of AI and the awareness of technology to large numbers of people. This is a problem of scaling the educational infrastructure.”

According to Sikka, if we want to keep up with the rate machines are learning, we should too. “One critical aspect of AI is education. We all need to learn more about AI, given how important it is going to be in the times ahead,” he says. “There are only approximately 300,000 machine learning engineers around the world – this number needs to be in the tens of millions in the next one or two decades.” Equally, he believes that education is not only crucial for democratizing AI, but that the need for open collaboration and lifelong learning will be even more critical in the future. “The ability to build explainable systems, the ability to build articulate AI, will require a lot of work from academia, from government, and policy setting,” says Sikka. “We really need to place a tremendous emphasis on education, which again requires cross-boundary collaboration, across universities, across education institutions, throughout life, and throughout careers”.

An exciting, intelligent future for AI

Speaking about the future of AI and what excites him, Sikka states that, “Looking further down the road, the ability to build more intelligence into systems, such as the ability to reason, the ability to articulate, to build systems...that's something I'm really excited about.” Sikka explains that getting to this stage involves continuing to build tools and platforms.

These sentiments are echoed by many in the industry, who describe AI as the “general purpose technology” of the 21st century, like electricity and railways were during the industrial revolution.

Clearly we all have a lot more to learn about the coming era of AI – and education sits at the heart of continual progress.
Why you need to be thinking about the DevOps-AI mix

DevOps – a process that combines software development and IT operations – is poised to become a greater catalyst for speed in the field of systems development, with automation and tighter collaboration between development and operations’ teams making it easier to put new code into production and align it with business objectives.

By Chris Pereira, Linda Xu

DevOps, believes coder, author, and product development expert Jez Humble, means that the world will continue to move away from that ten-year-old solution everyone’s afraid to touch to evergreen applications that are updated multiple times a day. While there are certain growth roadblocks with DevOps that prevent low performers from advancing, Humble, the CTO and co-founder of DevOps Research and Assessment (DORA), believes that a business future with DevOps and AI is faster, more secure, and more resilient.

DevOps: The new normal for business

According to a new report issued by O'Reilly Media, the global median pay for DevOps professionals is now US$90,000 a year. That trend is echoed in the 2018 State of DevOps Report released by DORA, which shows that the use of DevOps is increasing
We know that software delivery impacts business performance, and we know the capabilities that impact software delivery. Knowing these factors makes it possible to improve enterprise capabilities.

— Jez Humble, CTO and co-founder of DORA
By implementing DevOps principles, teams can deploy code 46 times more often and make changes to code 2,500 times faster.

and improving software delivery performance across every industry that was surveyed. The report benchmarks high-, medium- and low-performing DevOps teams, and the results are clear: DevOps is the new normal for organizations to rapidly deliver high-quality software consistently and at an industrial scale.

The upside to investing in DevOps capabilities is astounding. By implementing its principles, teams can deploy code 46 times more often and make changes to code 2,500 times faster. In terms of stability, the change failure rates of DevOps are seven times lower, while incident recovery is 2,600 times faster.

This isn’t news to Humble, who’s been a promoter of open collaboration and DevOps for years. “People are expecting models to pull in the latest data and be able to respond even more quickly,” he says. “You can’t have old models – old data isn’t useful. You have to collect and use the data quickly. This will become more important as the industry evolves into the era of AI.”

Challenges and payoffs

Despite the upside, integrating DevOps isn’t always smooth sailing, because it requires some tough choices. “For the last five years we’ve been studying the factors that predict high performance in software delivery and their impact on business,” says Humble. “We know that software delivery impacts business performance, and we know the capabilities that impact software delivery. Knowing these factors makes it possible to improve enterprise capabilities.”

However, every organization is different and has different constraints. Given this, what does Humble believe to be the first step? “Teams must feel some sense of urgency in addressing the problem. They must dedicate resources, capacity, and effort to continuously implement improvement work.”

Once DevOps is embraced and established, continuous testing and continuous release enables teams to consistently provide up-to-date and reliable software to customers. And that’s good for business.

Full-stack and open collaboration

Telecommunications is traditionally an industry with very long design and manufacturing cycle times. Then there’s the network itself. And you’re
To successfully implement DevOps in the era of AI, organizations need to embrace new ways of thinking and working. Some software developers may think that going faster means more risk, but that’s not the case if it’s done properly. High performers do well in throughput, stability, and availability. How? Through careful measurement, automation, and analytics. The elite performers deploy multiple times per day, get changes into production, and restore interrupted services in less than an hour. They’re seeing low-change fail rates – in other words, they’re doing exceptionally well in terms of both speed and stability. “You’ve got to train models,” explains Humble. “You’ve got to pull data in for model validation, making sure that instead of just scripts on people’s computers, you’ve got more industrialized reliable solutions.” That means upskilling workers, measuring performance, and changing mindsets. Tracking software delivery performance is critical to ensuring that DevOps delivers full value to an organization.

Huawei brings together people from all different parts of the industry, touching every different vertical, a fact that’s not lost on Humble, “Huawei is going all the way from hardware, basic parts of the stack, the network infrastructure, right through to developer tools and engineering, covering the whole value stream, which I think is really impressive.” Huawei’s DevOps solution is end-to-end across the stack, open, and very collaborative. Huawei’s approach to DevOps is based on Huawei Cloud, which fully aligns with DevOps. Humble believes that development teams will have to learn how to create and manage production-ready systems and how to continuously deliver functionality, which he adds, “Requires excellent automated testing at all levels, and the application of patterns such as branch-by-abstraction, feature flags, and a production immune system.”

Fostering new capabilities and measuring performance

To successfully implement DevOps in the era of AI, organizations need to embrace new ways of thinking and working. Some software developers may think that going faster means more risk, but that’s not the case if it’s done properly. High performers do well in throughput, stability, and availability. How? Through careful measurement, automation, and analytics. The elite performers deploy multiple times per day, get changes into production, and restore interrupted services in less than an hour.

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Four metrics for managing DevOps teams
Right now, what we’re seeing on the ground is stuff just hacked together. Developers pull things together from all different sources. It’s difficult to replicate that and it’s difficult to industrialize it. What Huawei is doing will change that, regularize it, and help industrialize the process.

“I lead times are a big problem,” says Humble. “If you’re training models, getting feedback, and getting those models trained and validated, it can take a really long time.” He believes the focus moving forward will be on boosting reliability and slashing lead times. “It’s all about really good configuration management, really good automation, and really good control on end-to-end solutions,” he says. Automating testing and deployment can predict the ability of continuous delivery, which in turn positively impacts software delivery performance and organizational culture.

However, it’s important for people to simplify as they go. Taking complex, fragile manual processes and automating them just creates complex, fragile automated processes.

DevOps in traditional software development has been about industrializing the process of getting changes into production, and making it reliable. Today, the tooling around AI and DevOps is still underway, with Huawei Cloud for AI laying the

Automation and AI in the DevOps universe

AI is changing the face of business for DevOps, with investment increasing in AI infrastructure such as toolchains and platforms. For developers, there’s a growing focus on training and validation models, data pipelines, deployment on the cloud and edge, and instrumentation. Demand is also growing for the comprehensive management of data and configurations.

Tracking these metrics gives visibility into the performance of the DevOps process and forms the basis of wide-scale adoption. The right blend of metrics gives organizations the visibility to understand what’s working with tools and processes now and what needs to be realigned or rethought entirely. It’s not enough just to implement DevOps; you have to learn the impact of its implementation based on data.

• Lead time for changes from check-in to final release.
• Deploy frequency of changes in production (throughput).
• Time to restore services if a fault occurs.
• Change fail rate after a change is deployed in production.

Voices from Industry
DevOps has been in a constant state of iterative flux. From basic systems, to amplifying feedback loops, to building a culture of continual experimentation and learning, DevOps is truly the new norm, with AI giving the movement even broader influence and momentum.

Since it was first coined in 2009 by Patrick Debois, DevOps has been in a constant state of iterative flux. From basic systems, to amplifying feedback loops, to building a culture of continual experimentation and learning, DevOps is truly the new norm, with AI giving the movement even broader influence and momentum.

There couldn’t be a better combination of capabilities than DevOps and AI. As we enter the era of AI, the focus in all industries is turning to delivering end-to-end solutions smarter, faster, and more efficiently than ever before. “DevOps is all about helping companies get faster in terms of their ability to deliver end-to-end solutions more quickly and more reliably,” says Humble.

Automation is uniquely positioned to assist IT operations in particular. Automation and AI provide the speed and stability that ensure high-quality IT operations to manage configuration consistency and release.

Tools with advanced AI-powered analytics are now available that can better predict and address issues in IT ops. For example, monitoring tools will tell you when an app’s performance is not up to par. But the real value comes from embedded analytics, which gives an insight into why. These learnings can be fed back to development and test teams to get the issue addressed even faster.

An intelligent future

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An intelligent future
Shenzhen Airport has developed at a rapid pace, much like Shenzhen as a whole. In 2017, the passenger volume reached 45 million. And it’s estimated that the number of passengers will reach 50 million and the cargo volume will exceed 11 million tons in 2018. Shenzhen Airport has become the core transportation hub of China’s Greater Bay Area.

A future-ready airport to support the Greater Bay area

Managing and controlling multiple runways and terminals is inherently complex and a daily challenge for Shenzhen Airport. We had long explored and tested solutions to the problem, but our information department acted in response to business demand, rather than pre-empting business needs.

In 2017, the International Civil Aviation Organization (ICAO) chose Shenzhen Airport site to build a worldwide showcase for future-ready airports. The first reason Shenzhen Airport was selected is that our business scenarios and operational complexity are widely representative of many airports and second, Shenzhen boasts a large number of science and technology enterprises that would be interested in contributing to the showcase.

When flights are delayed at Shenzhen Airport, more than 8,000 passengers can be stuck waiting at the same time. So how should the airport respond to this situation? I believe that new technologies, such as AI, will help Shenzhen Airport and other airports around the world solve this problem.

By Zhang Huai, CIO, Shenzhen Airport Group
Our aims are to become a global leader in airport operations and support the development of the Greater Bay Area. To be specific, we focus on three major aspects:

First, proactive security assurance. Over 30 percent of risks can be identified using digital platforms. By implementing digital technologies we expect to rank third in China in security assurance.

Second, efficiency within a limited space; we expect to shorten aircraft turnaround times, reach an on-time release rate of 85 percent, and reduce the taxi time for each aircraft by one minute.

Third, we intend to improve the passenger experience through the use of end-to-end services. Shenzhen Airport has plans to reduce waiting in line times by 15 percent and increase self-service bag drops by 30 percent.

**Enabling a future-ready airport through innovation**

To fulfill these goals, we began to work with Huawei to access new technologies and AI innovation engines.

Huawei and Shenzhen Airport are following the Platform + Ecosystem strategy to build a future-ready digital platform. Based on Huawei’s Information and Communications Technology (ICT) infrastructure, the two parties have integrated the Internet of Things (IoT), big data + AI, video cloud, Geographic Information System (GIS), and Integrated Communication Platform (ICP) resources. In partnership with other vendors, we’re building a platform-based ecosystem in which AI is playing an important role. For example, AI big data is used for applications such as knowledge graphs, machine learning, and natural language processing. AI vision utilities include facial and human body recognition, vehicle identification and tracking, and panorama stitching. The ICT platform is delivering operational control, security, and passenger services to the airport:
Our goal is to implement self-service resources such as information access based on AI-assisted video.

Intelligent and visualized flight services

The goal of Shenzhen Airport management is to deliver intelligent, visualized flight services. Jointly with Huawei, we’ve spent a year on projects using technology innovations to improve the efficiency of airfield operations:

Intelligent stand allocation: Based on big data and AI, the utilization of contact stands has been optimized to reduce the number of passenger shuttle buses. We’ve increased the direct boarding rate by at least 10 percent, which eliminates the need for shuttle buses in 100 out of every 1,000 flights and delivers a better experience for passengers.

Smart airfield ground lighting: Based on IoT and AI, individual light control, flight path planning, and conflict detection expedite taxiing before takeoff and after landing. For busy airports, the time between flight landing to passenger unloading can be 20 minutes or longer. If this time can be reduced by 20 percent, three to four minutes can be saved for each flight. In scenarios of 1,000 flights per day, up to 67 hours can be saved in addition to contributions for energy conservation and environmental protection.

Visualized ground operations: Video and AI technologies enable automatic information collection from IoT-connected sensors embedded across the airfield. The system conducts comprehensive computer-vision analytics and supervisory operations. In the past, all such activities were done manually, creating a higher risk.

Delivering an efficient airport experience

Apart from providing intelligent and visualized flight services, we’ve also performed joint innovation in regard to passenger trips. Future-ready airports will improve travel efficiency and provide better travel experiences with self-service check-in, self-service baggage drop-off, multi-layer security checks, smart Flight Information Display Systems (FIDSs), and facial recognition.
for boarding, last calls, and VIP services. Our goal is to implement self-service resources such as information access based on AI-assisted video. Specifically, we mean facial recognition, passenger route/flow analysis, and wait time analysis resources that are enabled by digital connectivity between passengers and airport facilities, and between the airport and airlines.

Regarding security screening, we understand that most passengers are nonthreatening, and heightened measures are only required for very few. Based on this, we discussed the possibility of simpler security screening with the General Administration of Civil Aviation and other official institutions. A differentiated-classification security screen is currently implemented in Shenzhen Airport — a process that we continue to refine.

Our goal is to provide facial recognition services through big data analysis for all passengers entering and leaving Shenzhen Airport. Facial-image-based access control eliminates the need for manual passenger identification and reduces the amount of time spent waiting in lines.

Innovation at this scale requires a comprehensive plan. Therefore, we’ve worked with ecosystem partners such as Huawei to promote the development and construction of a future-ready airport. It has taken us a year and a half to streamline business scenarios in a simplified manner and integrate the infrastructure, data architecture, and data platforms. To be specific, we implemented an overall plan — including top-level design, architectural model, and data governance policies; performed joint innovation to manage uncertainty, iteration, and ecosystems; and drafted enterprise and industry standards for a future-ready airport showcase.

On August 28, 2018, a Beijing Capital Airlines flight to Macao made a successful emergency landing at Shenzhen Airport. The decision by the pilots to divert to Shenzhen is a testament to the industry’s trust in our future-ready facilities. We believe that with further application of innovative technologies, we can do even better.

In the future, we will continue to work with ecosystem partners such as Huawei to deliver scenario-specific services, manage scenarios on the platform, and open platforms to the ecosystem. We will build a world-leading future-ready airport by focusing on security, efficiency, and the quality of the passenger experience.
In any scenario, from smart cities to smart transportation, construction safety is of paramount importance. Wang Changxin, CEO of Beijing-based Yunlu Technology, explains how Yunlu provides solutions to analyze monitored data from the entire construction lifecycle to discover potential construction problems and minimize quality and safety incidents.

By Wang Changxin

Construction safety matters

In many countries, infrastructure disaster-prevention mechanisms and prediction methods are now incorporated into key future plans. Infrastructure disasters often involve both natural and human factors. Natural disasters can be predicted through environmental monitoring such as meteorology, hydrology, and geological disaster predictions. Disasters caused by human error, on the other hand, can be avoided through regulations, design, and online monitoring systems.

Yunlu Technology has worked with Huawei Cloud to build a world-leading structural health monitoring (SHM) big data IoT platform using new technologies that covers the entire construction lifecycle and improves construction safety. By analyzing data from the O&M stage, it’s possible to control the usage and development trends formed during the O&M stage and provide data to support the departments that make maintenance decisions. Construction period monitoring and the analysis of O&M test data can provide a useful reference for the design stage.

Structural health monitoring (SHM) and medical health monitoring are somewhat similar. Both involve
collecting data and analyzing it to make conclusions about diagnosis and treatment. SHM has been developing for over 20 years. In most use cases, traditional sensors are still employed and, with the level of data compiled and collected, it's impossible to precisely or effectively analyze the data.

**Multiple disciplines**

This is an industry that combines multiple disciplines and domains. First, you need technological support that includes sensors, networks, cloud platforms, system integration, and computational mechanics. It also requires technical expertise in domains like architecture, bridges, and water conservation. You also have to perform big data analysis and AI-based data mining based on data modelling. Then you need to obtain valid structural damage identification, structural stiffness matrix calibration and reanalysis, and perform structural lifespan predictions.

**Yunlu + Huawei Cloud EI**

The system developed by Yunlu Technology and Huawei, Huawei Cloud EI rapidly discovers potential safety hazards through analysis and identification, issues early warnings of possible structural dangers, and provides data support for construction and O&M departments.

We've deployed over 50 Huawei Cloud platform development modules. All the services run on Huawei cloud services. We leverage middleware, including data storage services, as well as various platforms, such as ModelArts’ machine learning, deep learning, and image recognition platforms.

More specifically, Yunlu Technology has developed five use cases that utilize Huawei Cloud EI.

**Use case 1: Data collection**

The first use case is data collection. For example, fiber-optic sensors can be used to transmit data to a collection device, which then connects to an on-site host, and the data is then transmitted to the cloud. However, this deployment model is complex and expensive.

With the increasing interconnectivity of everything, we've adopted Huawei's IoT modules to make it more convenient to access the system. We also use Huawei's edge computing modules for prompt data processing. Moreover, by leveraging Huawei's edge devices we can access data from a variety of sensors to achieve multiple functions using one device.
With edge, device, and cloud synergy, overall equipment costs have been reduced by over 70 percent and the system response is twice as fast.

Ensuring the consistency of data and objects is a common challenge and problem. We leverage the Huawei blockchain platform to distribute all blueprints and contracts through the blockchain. This ensures that data and content from various stakeholders, including owners, planners, designers, construction, and O&M, is unified.

Use case 3: Structural health prediction

The third use case is structural health prediction. What we wanted to achieve here is to get prompt information about a construction project. If a building has a defect, we want to quickly replace the defective part to prevent an accident.

So we need to make effective predictions about the lifespan and health of construction, as capacity changes over time.

Using measurements of environmental loads, such as wind and temperature, as well as a structure’s true response, we’re able to calibrate the stiffness matrix. In this process, we can calibrate the overall matrix of the system, or design parameters, such as density, elastic modulus, and constraints, to arrive at the structure’s true current capacity.

We can then make accurate forecasts of a building’s structural response using predictable factors such as wind speed, wind pressure, and temperature. With the help of Huawei Cloud’s machine learning engineers, we’ve achieved a prediction accuracy of close to 90 percent.

Use case 4: Automatic site inspection

The fourth use case is automatic site inspection against construction specifications. With the industrialization of buildings, there are now many new forms of construction, including what are known as industrialized residential structures. These are precast buildings – the concrete is not cast on site; instead, the components are transported to the site for on-site assembly.

Residential industrialization is already a relatively mature industry and is common in many developed nations. China predicts that precast buildings will make up more than 20
percent of all new buildings by 2020 and over 50 percent by 2025. The prefabricated construction industry is set for rapid development, and while there are vast market opportunities, there will invariably be some technical problems that need an urgent solution.

For example, ensuring the strength of floors in the connection process requires all the grouting holes to be filled. In the past, this required people to inspect on-site photographs, which was very inefficient. Now we use Huawei Cloud’s ModelArts deep learning image recognition module to identify photographs of grouting holes and determine which are filled, which are not, and which are for threading pipes. Typically, you can upload 100 on-site images and achieve an effective identification rate of close to 80 percent. This solution has made the inspection department over 50 percent faster and reduced construction errors by 30 percent.

Use case 5: Structural damage identification

The fifth use case is structural damage identification. Sports stadiums, for example, are impacted by fatigue, corrosion, and ageing over time. And inevitably some damage occurs. Locating and defining the state of the damage is a crucial task.

However, sensors are only installed in parts of the structure. This is because the sensor layout must not impact the original structural properties of the building. Moreover, installing many sensors isn’t cost effective. As a result, we have to place as few sensors as possible, while trying to obtain a true picture of the building’s performance. This requires us to perform mechanical back analysis and damage identification from the data.

In the past, this identification process would mostly be applied to a few beams or boards. But by harnessing Huawei Cloud ModelArts, we can now identify more complex damage. Using Huawei Cloud’s EI platform, we have made mechanical simulations 100 times faster, and are able to implement an identification solution that supports real results from data, covers the whole structure, and includes monitoring and prediction.

In the future, we want to expand to low-energy, low-cost IoT applications to improve O&M management efficiency and lower costs. We’re also seeking to develop a structural health monitoring platform to eliminate security risks at an early stage to support the development of smart cities and smart transportation. And we hope to build a big data platform in the construction health monitoring field to promote the development of the entire industry chain.

At the heart of our collaboration with Huawei Cloud EI, we plan to achieve a safer, better life for all.
Shenzhen Traffic Police cuts fatalities and boosts enforcement with intelligence

By Li Qiang, CTO, Shenzhen Traffic Police Bureau

With a current total population of more than 20 million, Shenzhen has experienced massive economic growth alongside its surging population. In 2017, its GDP surpassed 2.24 trillion yuan (US$326 billion), the third highest in China.

In the same year, Shenzhen had 3.35 million vehicles, giving it the highest number of vehicles per capita in the country. However, Shenzhen’s traffic system still runs very smoothly in a controlled manner, winning excellent feedback from residents. In fact, the city never makes the top 40 cities in China in terms of congestion levels.

How we did it

In 2017, Shenzhen Traffic Police Bureau (STPB) and Huawei jointly launched a project to build a city-wide Traffic Brain. The Brain features three kinds of intelligence:

Perceptual intelligence: Intelligent IoT devices, such as electronic police surveillance cameras, automatic vehicle identification checkpoints, and traffic cameras, give the brain dynamic global perception of traffic flow, incidents, and traffic violations.

Computing intelligence: The brain harnesses the powerful heterogeneous computing power of Huawei Atlas and the advanced algorithm analysis capabilities of Huawei’s EI platform to solve operational bottlenecks caused by mass video and image data.

Cognitive intelligence: The brain is able to judge traffic conditions and optimize signal timing based on traffic rules discovered through knowledge graphs and reinforcement learning.

The Traffic Brain also has additional capabilities. STPB has evolved the system into an intelligent twins-based traffic system with front-end perception, overall decision-making, regional control, and the ability for continuous improvement.

STPB unified the upper-layer portal integration platform to meet government, public security, and user needs. The platform is able to query, analyze and model any requirement. We also unified the underlying hardware platform, and bundled its algorithms into an algorithm warehouse, laying the groundwork for technology and business to organically combine for much better productivity.

Today, Shenzhen’s Traffic Brain handles perceptual data from over 2,400 intersections and 200 TB of video data per day. It boasts a total storage capacity
“The brain has achieved outstanding initial results, implementing over 100 algorithms and the ability to process 50 million images a day.”

AI empowers a new era of traffic management

The Traffic Brain combines technology and policing with the help of AI and a digital twin system. Major changes have already been achieved in three areas: (1) traffic enforcement; (2) reducing traffic congestion; and (3) command.

In the area of traffic enforcement, AI-assisted enforcement has increased both the quantity and quality of violations’ enforcement. In the first half of 2018, STPB boosted enforcement rates by 15 percent by deploying AI applications that can detect drivers who use their mobile phones or who aren’t wearing seat belts, plus facial recognition.

In terms of reducing congestion, traffic lights are now able to watch and count the number of cars before turning green. STPB also launched a number of technological measures to reduce traffic, including contraflow left-turns, zipper merging, and reversible lanes. It also deployed the digital twin-based traffic system TrafficGo at 43 intersections in Longgang, Shenzhen. In a pilot of online signal timing, the wait time at key intersections was reduced by an average of 17.7 percent on average, and traffic speeds and rates have both increased.

The third area of improvement was command – the new operations command center closely integrates fast response and smart management. The emergency response time of STPB’s Iron Riders Team has dropped by 67 percent, with gains in management capabilities and efficiency.

Through the above measures, STPB has brought about safer, smoother, and more efficient driving. In 2017, Shenzhen’s traffic accident mortality rate fell to 1.07 per 10,000 cars, and the number of deaths decreased by 16.83 percent from 416 in 2016 to 346 in 2017. These figures put Shenzhen on a par with Singapore and Hong Kong in terms of traffic fatalities. The winds of change are picking up with AI.

As a manager in the transportation industry, STPB will continue to be a test bed, pioneer, and explorer to create a digital twin-based city traffic system for Shenzhen, using intelligence as an enabler to improve the experience for all.

of 20 PB and leverages a 4,200-km optical transport network (OTN) with 800 GB of bandwidth. The brain has achieved outstanding initial results, implementing over 100 algorithms and the ability to process 50 million images a day.
Activating Intelligence

Smart cities and smart agriculture

Industry and smart city experts from around the world gathered at HUAWEI CONNECT 2018 to explore how artificial intelligence (AI) is being harnessed to build smart cities. Cases in focus at the Huawei event included the TEDA system, which applies the Intelligent Operations Center (IOC) and four large-scale AI platforms for Tianjin’s Binhai New Area; land digitalization to smartify agriculture in Qingdao; and the case study of Germany’s Duisburg, where cloud computing and IoT are making the city smarter and more attractive.
The new AI engine driving smart city development

China’s urbanization rate has risen 37 percent in 37 years, bringing a host of challenges for urban areas, including traffic congestion and pollution. Driven by services and technology, smart city construction has emerged as a solution to these problems. Service drivers comprise customers, service requirements, and architecture, while technological drivers include AI, data, and cloud. Collaboration in terms of these drivers are key topics today.

Cities have numerous requirements and a vast range of services, with no single company able to provide all. A city is much like a human being in that it needs a brain and nervous system to perceive, see, and think. According to Dr. Zheng Zhibin, President of the Global Smart City Business Department, Huawei Enterprise BG, “Huawei is committed to becoming a Smart City enabler and promoter by providing cities with a ‘nervous system’.

Based on its Platform + Ecosystem strategy, Huawei is currently developing the +AI Smart City Digital Platform.” The platform is based on Huawei’s ICT infrastructure and, through an industry enablement platform, integrates five main resources: IoT, big data + AI, video cloud, Geographic Information System (GIS), and converged communications. Huawei has also joined forces with its partners to build platform ecosystems.

Practical application shows that a digital platform featuring resource coordination is vital for the sustainable evolution of smart cities. A powerful AI engine not only helps strengthen a city’s nervous system, but also enhances its self-learning and self-evolution capabilities.

Oleg Logvinov, the chair of IEEE P2413, believes that technological advancement is a key driver of urban development, with AI at the core of smart city development. City managers have been harnessing AI in urban planning, public safety, transportation, and energy to help them make scientific decisions and create new digital economic models.
The smart city system usually originates from the service layer and, in the past, data systems were used to support service systems. But this actually wastes the value of data.

**Tianjin: AI + Smart City**

Spread over 2,000 square kilometers, Tianjin’s Binhai New Area (BNA) has a population of approximately 3 million and a GDP of around 700 billion yuan. At the heart of BNA lies the Tianjin Economic-Technological Development Area (TEDA).

The development of TEDA has reinforced the fact that the merger of smart cities with big data is inevitable. The company TEDA was founded in 2007, with the aim of building simple government administration platforms. But by 2017, TEDA had developed to the point that the smart city builder now faced a bigger challenge: building a big data system.

TEDA’s smart city system is divided into three layers. On top is the service system, which includes various departments, such as approval, public transportation, and healthcare, as well as integrated platforms, including cross-departmental systems, which provide services and management for enterprises and residents. Below this is the data information layer, which comprises data aggregation and analysis capabilities. Then under this layer comes the support system layer.

Traditionally, this is the cloud and network, but when it comes to building a smart city with big data, the data platform has higher priority.

The smart city system usually originates from the service layer and, in the past, data systems were used to support service systems. But this actually wastes the value of data. Data can directly generate value through AI, and not just through application platforms, by providing more direct services for governments, enterprises, and residents under an architecture that bases smart cities on AI and big data.

Huawei helped TEDA design an AI-based 1+4+N solution, comprising one IOC, four AI platforms, and multiple applications. Huawei’s IOC functions like a city brain. The IOC processes, communicates, and mines data collected about the government, enterprises, residents, Internet, and IoT. AI technology then enables deep analysis by this brain.

The IOC coordinates closely with the four AI platforms to support services such as Residents’ Voices, Sensing the City, Healthcare in the Community, and Enterprise Services. Applications are based on the IOC and four platforms to develop a happiness index that
measures safety, beauty, convenience, harmony, civility, and vitality, with the aim of improving life.

Qingdao: Land digitalization for smart agriculture

China has just 120 million hectares of arable land and imports more than 50 percent of its food. The country also has 100 million hectares of saline-alkali land, of which between 13 and 20 million hectares has the potential to be transformed into fertile land to produce more grain. Seawater rice (salt-tolerant rice) can be planted on saline-alkali land, making it fertile land.

Led by the scholar Yuan Longping, the seawater rice strain was developed by the Qingdao Seawater Rice R&D Center, yielding in tests 9.3 tons per hectare in China and 7.5 tons per hectare in the Dubai desert. Yuan and his team want to transform around 6.7 million hectares of saline-alkali land into fertile land within 8 years. This would boost China’s grain production by 30 billion tons a year and feed 80 million people – equivalent to a medium-sized European country and the number by which the population of China will increase over the next 20 years.

Soil digitalization based on Huawei’s IoT system plays a vital role in the miracle of seawater rice cultivation. Sensors on or under the ground collect information such as illumination, temperature, and salinity/alkalinity, which is then sent to Huawei’s cloud big data center over an eLTE network. Then, suggestions on recommended pesticides, directional fertilization, and pest and disease control are produced by the AI system, which in combination with expert diagnosis, helps to improve rice planting on the saline-alkali land and increase yields.

Yuan’s team and Huawei have jointly planned and developed a fertile soil platform for smart agriculture, which is helping to move agriculture into the fourth of four development stages:

In the agriculture 1.0 period, everything relies on manual labor. Agriculture 2.0 is the use of agricultural machinery. Agriculture 3.0 is fully mechanized production. And agriculture 4.0 is defined by whole-region, whole-chain unmanned agriculture with minimal interference.

Yuan’s team has three goals: step one, agricultural digitalization; step two, agricultural intelligence; and step three, the systemization of agricultural products.
Duisburg: Cloud computing and IoT

Duisburg is a city in the Ruhr Area of central Germany, one of the most densely populated areas in Europe. Ruhr is also a major steel production area, but due to the smartification of Duisburg, the number of steel workers in the city has plummeted from 70,000 to 16,000. Duisburg is transforming from an industrial city into a smart city, and needs to find new growth areas so it can adapt to the changing times. Smart city construction can help accelerate the development of Duisburg and improve citizens’ lives.

Duisburg aimed to benefit from the opportunities provided by digitalization, using new ICT technologies to improve urban life experiences, promote economic growth, and attract more residents, enterprises, and investors. With its capabilities in technological innovation in cloud computing, big data, IoT, and AI, and its experience and strengths in helping cities determine their future directions of development, Huawei was a natural choice for Duisburg when it came to choosing a partner for its Smart City project.

At the cloud computing infrastructure layer, the Rhine Cloud supported by Huawei’s technologies provides a basic platform for Duisburg’s cloud strategy. It has driven technological innovation and the implementation of e-governance, transportation, IoT, and unified communications. With the construction of this smart foundation, Smart Duisburg 1.0 has been achieved.

At the IoT layer, Duisburg will use Huawei’s 5G, Wi-Fi, and WLAN technologies and IoT platform to implement the real-time perception of city components. This will enable the construction of a connected nervous system network of urban facilities, such as transportation, logistics, power, and industrial manufacturing, facilitating the implementation of smart living, autonomous driving, smart traffic lights, smart parking, and smart city operations. This will help bring about the Smart Duisburg 2.0, a stage that will be based on smart experiences.

In another example, this time in education, Duisburg has also focused on smart classrooms, including WANs and broadband connectivity, as well as free Wi-Fi. The city leverages Huawei’s experience in 5G, IoT, and broadband technology to implement smart logistics and Industry 4.0, which has helped improve the lives of Duisburg residents and make the city a more attractive place for investment.

Huawei is committed to being a doer in the field of smart cities, harnessing AI to lead new smart city construction.
El Corte Inglés S.A.

Rejuvenating a 100-year-old retail giant with technology

Founded in 1935, Madrid’s El Corte Inglés S.A. (ECI) is the largest shopping mall chain in Spain and the fourth largest department store group in the world. With 86 stores in Spain and Portugal, ECI offers a broad range of high-quality goods alongside additional services like home delivery, tailoring, and gift-wrapping.

By Li Bingfeng, Bai Rendong
The customer is always right

ECI revolutionized the retail industry in the early 1970s by launching an unconditional refund service, embodying its philosophy for prioritizing customer satisfaction. This approach was soon copied by department stores worldwide and, in Spain, resulted in a golden age of retail.

The Financial Times, for example, reported that, “For many tourists, ECI is another symbol of the country, like the unfinished Sagrada Familia in Barcelona or the Prado Museum in Madrid.”

However, the rise of online shopping has meant that e-commerce has begun to supplant brick-and-mortar establishments, causing unprecedented challenges for traditional retailers.

ECI has to cope with data from hundreds of online and offline sales channels, inventory in 38 logistics centers, and a large number of members. Nearly a billion data entries have filled ECI’s sales data processing systems to capacity since the inception of e-commerce, a trend where omni-channel customer service systems are crucial.

Data analytics proves its worth

The recent tide of digital transformation compelled ECI to go in a new direction. Facing a deluge of complex data, a data analysis platform capable of extracting valuable business results and driving quick decision-making is vital for improving customer experience.

“We want to build an enterprise-grade high-performance data platform to develop business analysis applications, and support real-time analysis for online and historical data,” said a spokesperson for Informática El Corte Inglés (IECISA). “The analysis results will help executives make timely and correct business decisions, such as better real-time inventory management and out-of-stock replenishment.”

This vision inspired a prototype of ECI’s High-Performance Analytical Platform (HAP).

ECI purchased four SAP HANA systems during the early stages of the platform’s construction. However, the scale-out architecture system involved multiple servers that complicated device O&M. A large amount of data interaction between HANA nodes greatly reduced performance.
and caused poor overall IT O&M. On top of that, the retail chain’s suppliers were reluctant to develop an innovative platform, which ECI needed to deploy big data analytics in its internal data warehouse. Therefore, ECI faced mounting pressure both internally and externally, and the platform’s construction came to a halt.

**Choosing the right solution**

Renowned for its stability and reliability, Huawei’s x86-based KunLun Mission Critical Server platform features unparalleled efficiency to provide premium services for enterprise customers across industries, inside and outside China.

At the beginning of 2017, Huawei invited ECI’s executive team to its headquarters in Shenzhen. With an understanding of ECI’s requirements for high performance and near-real-time analytics, Huawei worked with SAP to launch the single-node 8 TB KunLun HANA appliance scale-up solution, a bold idea based on Huawei’s experience with over 3,000 deployment cases.

Compared with ECI’s previous scale-out solution, Huawei’s solution improves performance by 30 percent without using external storage or switch devices, which simplifies deployment and management. Data table redistribution isn’t required after capacity expansion, and all these advantages — coupled with the high performance and reliability of the KunLun servers — counteract any traditional scale-up solution reliability issues.

As the industry’s first single-node 8 TB scale-up case, the application had to pass SAP’s rigorous certification process before moving forward. Thanks to the joint efforts of ECI, SAP, and Huawei, SAP certification sign-off was completed within a single month, significantly down from the usual one-year process.

Finally, ECI was making material progress with its digital platform construction.

**Huge efficiency gains**

The new digital platform has revitalized ECI. Today, based on sales conditions, stock shortage analysis, and automatic replenishment take only minutes. Overall inventory turnover has increased by 20 percent, which saves a colossal amount in annual warehouse fees. The new platform eliminates service bottlenecks and allows for smooth upgrades and capacity expansion, which supports future service development, and achieves system-level availability 24/7.

The new system outperforms the previous system by a staggering 1,000 times. ECI can now tap into the value of data and no longer experience performance bottlenecks. ECI drives accurate insights into service data in a quasi-real-time manner by analyzing current inventory status, shortages, and production transfer purchase orders.

The nearly century-old retail chain is now on the right track to complete digital transformation.
Telenor

Connecting customers to what matters most

Telenor Group is one of the world’s major mobile operators. Alongside its Scandinavian operations, the Norwegian telco runs five business units in Asia, covering Myanmar, Bangladesh, Pakistan, Thailand, and Malaysia. Telenor exists to connect its 172 million customers to what matters most and is always striving to empower societies in the markets that it’s present. While each country has its own specific market characteristics, Telenor Group’s Senior Vice President Kim Krogh Andersen shared the telco’s overarching strategy.

By Gary Maidment
WinWin: Your strategy is “connecting customers to what matters most.” Can you tell us how you will achieve that?

Andersen: We believe that it’s fundamental to personalize customer experience based on their needs and preferences, and to do that we need deep customer insights, tools, and capabilities. Internet Access is our foundation and that’s the product that we build our personalized experience around. When we combine artificial intelligence and machine learning capabilities with our insights from Network NPS, we have a good understanding of what matters most to our customers. We ask our customers about their loyalty once or twice every year on average and what matters most differs from market to market.

With all these insights, we’re presented with many more choices. This means that we need to prioritize where we need to invest. Should we aim to have the fastest network? Best video experience? Most available network? Best voice or data experience? Best indoor coverage? Best coverage in rural areas? Best coverage in tourist areas? Best coverage in the subway system? When we look at customer feedback from all markets, there’s one thing that recurs: consistency. The network needs to work at all times. We also see that our ability to communicate and be transparent about what our customers can expect from us is super important. Our shared aim is clear: We want to have a customer-centric operation that can be predictable and proactive towards our customers, while providing them with a personalized experience.

WinWin: Can you give one or two examples of how Telenor is approaching personalization?

Andersen: The foundation of personalization is data and data management. It’s very important to have control of our first-hand data, data from our BSS system and OSS tools, and data from all over the company. And we must utilize...
Telenor is a big B2B player in Scandinavia and we firmly believe that we can expand that to Asia and take a position in that segment, and at the same time prepare for new business models within the 5G domain.

that data in a structured way. It’s also important that we get insights directly from customers and third parties to maximize relevance.

Based on this data, we can design personalized, relevant offers for customers, improve customer care, and provide a better experience. In the future, we will personalize the experience around Internet access products. We’ve also set up a Network NPS to get direct feedback from our customers every day in all of our markets. This combined with the data we have from the network really gives us the opportunity to do what matters most for customers.

WinWin: What strategies does Telenor have for growth in Asia?

Andersen: We hold the key belief that Internet access is our core. All our markets still have much potential. Emerging markets like Myanmar, Pakistan, and Bangladesh have much potential to grow in the area of mobile business. We’ve launched LTE in all these markets and the penetration and affordability of handsets will increase in the future. We believe that we can take part in that journey and provide Telenor with growth from these markets.

If you look at developed Asia, which we define as Thailand and Malaysia, these countries are some of the most digital in the world, with users spending the most time on mobile devices. So, mobile infrastructure will grow a lot moving forward. We need to be innovative and engage in the ecosystems in these markets to be part of the growth that’s connected to this digital development.

There are also very interesting technologies coming with 5G. For example, we have fixed wireless access as one way to provide a similar solution to FTTH. We’re already partnering with Huawei on a pilot in Myanmar that potentially can be scaled across all our markets. There are also solutions like video, IoT, and VR that will give us growth potential if we do it right. Telenor is a big B2B player in Scandinavia and we firmly believe that we can expand that to Asia and take a position in that segment, and at the same time prepare for new business models within the 5G domain.

WinWin: Telenor has done well at improving efficiency. How will you sustain this momentum?
**Andersen:** We’ll drive efficiency with simplification and automation through machine learning and AI to create predictive capabilities and ensure we’re as efficient as possible in our internal processes and operations. We’ve started the journey to become an automated and customer-centric operation, and we can see how the use of data and machine learning is helping us in areas like alarm predictions, traffic forecasting, hotspot predictions, network planning, churn prediction, NPS prediction, predictive hardware failures, predictive maintenance, running performance and optimization analytics.

We’ve also talked about efficiency in the way we design our towers. Here, active and intelligent design is important to cut costs and improve availability, because power is an issue, especially in emerging markets. If the power supply is unstable, we won’t have availability and we cannot connect to what matters most. It’s very important for us strategy-wise, and at the same time, to be environmentally sustainable.

On the CAPEX side, we need new technologies like massive MIMO to extract the maximum capacity from the spectrum we have. For new innovative equipment and solutions, our partners like Huawei are key. We have a common challenge to bring the newest solutions to the markets in a fast and agile way to stay ready for capacity needs. Massive MIMO and other solutions introduced with 5G will help us not only with efficiency but also with growth.

Structural changes like infrastructure sharing will also going forward be fundamental to keep costs down going forward. With 5G and the need for site densification this will be even more important.

**WinWin:** WowPlay video app was launched in April 2018, with Huawei providing the platform and content. It already has 115,000 users. In terms of partnerships, what do you expect from Huawei?

**Andersen:** After one day in Shanghai and now here in Shenzhen, seeing the R&D capacity and resources that Huawei has put behind innovation, I’m impressed. With this kind of innovation focus and capacity, it’s super important that we improve our ability to utilize this as a growth engine and not only as a way to improve Internet access quality and cost.

WowPlay is a very good example of moving from a transaction model to a model where we go for innovation together and see if we can provide a service that attracts customers and achieves growth that benefits both companies. Hopefully, this is just one of many examples of joint innovation. Telenor and Huawei have also cooperated for many years in a joint innovation center to try out new services and technologies that improve the way we deliver Internet access.

**WinWin:** Operators want to be the first to deploy 5G. But scaling 5G is crucial. Where and when do you see the first large-scale deployment of 5G?

**Andersen:** I think there are some trigger points. The handsets need to be ready, and they’ll probably be coming soon. Then there’s spectrum, which needs to be available. And then we need to look at the market conditions and where different use cases fit.
There’s a lot of hype about 5G and there are definitely countries, operators, vendors, and partners that are really pushing for early launch. The pilot we have in Norway and the EU project 5G-VINNI has given Telenor a good foundation to embark on the 5G journey. The pilot in Norway and general 5G readiness are only possible with innovative and forward-leaning partners like Huawei.

WinWin: What will be the driver for 5G? New growth or per-bit cost?

Andersen: First I think the commercial part of being first or in the first wave is important to gain some brand equity. After that I believe use cases like fixed wireless access and IoT will be drivers – even though we can deploy that with 4G technology – quality will increase with 5G. So, those are some use cases that are important. In time we will see capacity demands, especially in the super big, dense cities we have in Asia, like Bangkok, Kuala Lumpur, Karachi, and Dhaka where 5G will be necessary to deliver the expected experience and demand for capacity in an efficient way.

WinWin: Going forward, what major challenges do you think operators need to overcome?

Andersen: There’s a lot of potential in Internet access as a core product to both extract value and ensure that we’re part of the value chain. We really need to both change as a company – change the way we collaborate with our partners – and utilize data and insights. I think AI and customer insights are key to connecting our customers to what matters most to them. To do that, we need to have control of our data and use customer insights in an intelligent way. Then we can achieve our growth ambitions. But it’s hard work and we need good partners.

We have a good and long-term relationship with Huawei, and a partnership like that needs to follow the strategy of development for both parties. I see a lot of potential going forward, not only for equipment, but also in services and use cases like video and fixed wireless access in Myanmar.

Hopefully we can expand our collaboration to not only be our equipment vendor, but also utilize the enormous innovation power of Huawei to help us grow into the future.
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