



From kindling to energy: Why Huawei does AI

By Wang Lingfeng, independent tech & finance reporter

It took thousands of years to get from making fire to the energy system we have today. Coming up with a new technology isn't easy, but moving from its origin to universal adoption is a long and arduous journey. This was so in the case of technologies such as fire, the steam engine, oil, and computing.

Artificial intelligence (AI) is no different. When Turing proposed his AI hypothesis, he didn't consider how it would be applied in the world economy, nor did he need

to. But the task of developing AI from a technical theory into real-world application is relevant today – AI is very useful, but how do we make use of it?

At HUAWEI CONNECT in October 2018, Huawei Rotating Chairman Eric Xu announced Huawei's AI strategy and its full-stack, all-scenario AI portfolio. From 2019 onwards, Huawei will start to provide all-scenario AI deployment capabilities for public cloud, private cloud, edge computing, IoT industry devices, and consumer devices.

As far as we know, no other company has built such a comprehensive full-stack AI solution. So why did Huawei feel the need to go through so much trouble to build a system-wide AI architecture? What use is "full-stack, all-scenario"? And why aren't other companies rushing to get a head start in it?

The answers to these questions touch on the AI industry itself and the chain of logic in Huawei's AI strategy.

The logic is Huawei's but the story isn't just about Huawei. AI is like the wood-drilling technique for making fire. From the first time a human ever used kindling for fire to the construction of a smart energy industry, there were countless successive ferrymen to take us across the river on many, many trips. They each had one job: discover. And then the next one would jump the next hurdle.

Today's AI problem: Brilliant but difficult

Why does AI need a full-stack solution? Because AI is the interactive logic between machines and the real world. Machines can see and hear, which is an important thing in any industry – this is why AI is so brilliant.

So are all industries able to utilize machines' ability to see, hear, and think? It seems not.

Let's look at several real-world cases:

A **rubber manufacturer** wanted to build an AI system to automatically monitor

ingredients. In the design, the system would use machine vision and data analysis to remind workers to add ingredients. The factory found an algorithm vendor and the model that ran from the framework worked well. But as soon as the system was installed and used in the factory, it failed to issue warnings when it was supposed to, resulting in the considerable waste of raw materials.

This is a common problem. Today's machine learning models are often test cases where benchmarking isn't a major issue. However, when these models are deployed in real-world environments, they need to work in line with bandwidth, computing power, hardware, latency tolerance, and other factors – and are often exposed as inadequate as soon as they're deployed. And with AI systems that are truly integrated into production lines, you're even more likely to see worse problems.

There was also the case of an **industrial park** that wanted to upgrade its campus monitoring system to a smart monitoring system. But, the park managers discovered they'd first need to replace every camera in the park and then change all the utility poles to specialist ones to supply power and a network connection.

In another case, one **factory's** management called for AI transformation and so its technicians began to draw up designs. They discovered that their production system was extremely complicated and they couldn't find an AI solution suited to their vast IT system. In the end, they just upgraded all the water dispensers in the factory to smart ones, which caused them to be a laughing stock.

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These companies wanted to use AI, but they were blocked by the fact that their AI solutions only existed on paper. A viable solution requires innovation in basic technology but more importantly, it needs a technological system suited to industrial AI applications, so that companies of all sizes can obtain their own entrance tickets to the AI game.

This is where full-stack, all-scenario comes in.

Working back from the outcome: What AI needs, Huawei does

With the computing power and a training

environment that could meet the needs of an industry-grade AI application, the rubber plant could have smoothly enhanced its production efficiency with AI. If the industrial park had the capability to construct an edge-computing AI processing array, it wouldn't have had to painstakingly replace every utility pole. If the factory could have built a private-cloud AI solution according to the requirements of a large enterprise, it could have achieved much more than just passing off some new water dispensers as an AI project.

The problem with the application of AI in industry today is that the requirements are complex but the available B2B solutions tend to be homogenous. Some customers need to go through the whole process from development to training; some require large-scale deployment of compute power; and others want edge computing AI capabilities. So given the ever-changing enterprise and industry needs, the conclusion we've worked back to is: AI supply must be full-stack.

This is why Huawei has built a full-stack AI architecture covering chipsets, the framework, the edge, and devices. Customers can use Huawei's AI services in different product forms and technical systems based on their own needs. They can choose the combination of technologies they need to achieve integrated, automated, multi-level, and precise deployment of AI models, be it to coordinate complex user environments, optimize cross-technology/tier model collaboration, or deploy AI based on cloud-edge-device synergy. By leveraging

full-stack architecture you can carry out flexible splitting and reconfiguration for all these scenarios, supporting different user requirements. This is the all-scenario capability that Huawei's AI system emphasizes.

For AI to move beyond theoretical papers and frameworks into the real world, a full-stack full-scenario AI solution appears to be a necessary link. So the logic is very simple. Huawei will build solutions targeting the most prominent problem facing AI.

So the next question is: Don't other companies understand the importance of full-stack, all-scenario AI? Why is Huawei the only one to have built a complete solution?

Why is Huawei the only company with a full-stack solution?

The answer is that Huawei's AI solution is based on Huawei systems and is positioned to meet Huawei's requirements.

Here's the thing: Only Huawei is in a position where it doesn't need to make that much of an effort to embrace AI or worry too much about the future AI market. As Huawei's Chief Strategy Architect Dang Wenshuan, puts it, "For Huawei every layer of the AI architecture comes naturally."

Take AI chips for instance. These are considered the most difficult component

to build. But for Huawei there's nothing too complex about neural network chips. The main challenge lies in chip design and technology, and Huawei has built up precisely these capabilities through its various chip designs over the years.

In another example, algorithm companies often experience a pain point in cloud-device integration when building full-stack AI. The deployment of edge computing devices, stations, and IoT devices for AI systems is their kryptonite. But Huawei happens to have strengths in deploying multiple cloud, device, and edge IT products.

Full-stack AI requires competency in many complex technologies and industry coordination. Here, Huawei will be able to harness its long-established ICT industry strengths to build capabilities in AI solutions and product channels. The principle is the same when playing a piece in Go. If you have sufficient well-positioned pieces early in the game, you'll have the advantage later on.

Where Huawei's AI architecture fits is even more natural. Huawei Rotating Chairman Eric Xu once said that it wouldn't matter if no one used Huawei's AI solution because it would be okay if it were just used by Huawei internally. Huawei has already been applying AI in its public cloud services and consumer devices. So with these two foundations in place, Huawei doesn't need to be too concerned with the commercial issues of full-stack AI. Heavy investment in AI is a good fit with Huawei's fundamental interests.

Full-stack AI requires competency in many complex technologies and industry coordination.

Full-stack, all-scenario AI systems will enable service enterprises to cultivate sufficient technological flexibility and openness so that customers can grow in the future.

Red alert for the future: Why can't Huawei "shirk" on AI?

If Huawei didn't have an AI strategy, launch a full-stack AI architecture, or shirked on its technology investment a little, what would happen?

Perhaps this is a question companies working in enterprise services must ask themselves today: In the face of an uncertain future, do we dare miss out on AI?

First of all, for a company like Huawei, losing AI would be equivalent to losing vast service requirements in the future.

Industry AI requirements are a vast proposition, covering government, social infrastructure, operators, enterprises, and research institutions. And they're closely related to consumer devices. As customer demand for AI continues to grow, not offering AI would be equivalent to kissing future market growth goodbye, and would increase the risk of being eliminated in the enterprise market. The best way to withstand future risks is to first develop an AI strategy.

So if Huawei wants to offer AI, producing a full-stack solution sooner rather than later is the best thing for customer systems.

Full-stack, all-scenario AI systems will enable service enterprises to cultivate sufficient technological flexibility and openness so that customers can grow in the future. On the road to intelligence,

companies fear that technology for service providers is difficult to upgrade. Therefore, a complete AI architecture has become a problem that Huawei must find a complete answer to in one shot.

The two previous AI winters in history came about due to implementation issues. And no one wants to see a repeat.

The logical relationship between Huawei and AI can be summarized as follows:

In the past, AI industry development left problems behind that needed solving. Alongside, market opportunities, Huawei realized that it must build full-stack AI. Now, the full-stack AI system, including chipsets, frameworks, and cloud-edge-device has developed naturally thanks to Huawei's industry deployment and investment in technology.

In the future, facing the pressures and responsibilities of the unknown, Huawei will need to make AI a core part of its strategy – the technological systems it develops should comprise optimal solutions based on problem awareness and strategic anticipation.

When dealing with AI, perhaps all companies should base their choices on a similar logic. We have seen the fire after all. If we take a step forward, we may gain an energy source we can continue to use forever. If we take a step back, we'll be left with ashes. 🚫