Huawei’s answer to incorporating the Internet of Things into the global manufacturing industry is Agile IoT.>

Over the past three centuries, three industrial revolutions have transformed business and society based first on mechanization, then electricity and assembly-line production, and most recently, Information Technology, or IT.

A fourth industrial revolution is approaching that will be characterized by digitization and networked production combined with self-organizing machinery.

Built on a combination of the Internet of Things (IoT) and Cyber-Physical Systems (CPS), a key enabler — the Central Nervous System (CNS) — for “Agile IoT” will be Information and Communications Technology (ICT).

IoT Market Opportunities
Developed economies such as the United States, European Union, Japan, and South Korea have all announced national IoT initiatives. For example, as part of their national strategies, IBM has proposed the “Smarter Planet”, General Electric the “Industrial Internet”, and Germany “Industry 4.0”.

China has introduced its own strategies, such as “China Manufacturing 2025” and “Internet Plus”. These plans also encourage the foundational use of IoT for re-inventing traditional industries.

Much like the Internet in the past, IoT is evolving as the new value creator for industry that will inevitably accelerate today’s hyper-competitive global market and produce trillions of dollars in global output.

Agile IoT, powered by ICT, will become a key enabler for industrial innovation and transforming manufacturing.>

Energy Industry: Smart Grid
A Smart Grid is a modernized electrical power grid that has been integrated with advanced sensors, metering, network communications, and computer control technologies within an infrastructure of generation plants, transmission towers, transformer components, and premises distribution.

Smart Grids provide continuous, fault tolerant supplies of electricity under the command of an optimized, demand-based, resource allocation controller that assures product reliability, physical security, and environmental compliance.

Sensor-rich substations, distribution networks, and meters are embedded in a fabric of ICT gateways, servers, and storage solutions that support the addition of important value-added services.
The architecture for the Advanced Metering Infrastructure (AMI) makes possible power consumption automation based on real-time, two-way communication between all active components from generation to premises. The energy management platform, an IoT data center, enables the network of AMI smart devices to combine high-quality, baseline data with the live stream in order to conduct the type of Big Data processes that track demand fluctuations dynamically, find weak spots in the physical plant long before they become critical, and monitoring for loss prevention.

**Real Estate: Managing Energy Efficiency**

Low-carbon, eco-friendliness, and energy conservation are dominant themes in building construction today. Green buildings maximize energy conservation, reduce emissions, and provide healthy, comfortable living conditions. Buildings use a significant proportion of total energy consumed, and managing their efficiency is a top priority for governments and industry around the world. In 2013, China’s State Council predicted that green buildings would grow to more than one billion square meters in floor area by 2015, with 20 percent of new buildings in urban areas built with green technologies.

Old school management systems relied on manual switches and walk-by metering. More recently have come motion sensor lighting, and automated heating and air conditioning. Often missing are the purpose-built data analysis systems for improving Operations and Maintenance (O&M) efficiency. The current era of intelligent and self-adaptive controls, remote metering and data collection technologies, centralized analysis, and unified management have provided a dramatic positive to lowering operating costs and improving customer satisfaction.

Huawei’s Building Energy-Efficiency Management System (BEMS) Solution uses IoT technologies to centrally manage, monitor, and control all in-building systems, including power distribution, lighting, air conditioning, and heating. To optimize energy conservation, building owners apply the results of energy consumption data captured from all monitored systems using Big Data platforms and methods.

The Huawei solution supports flexible energy control policies that intelligently adapt to ambient changes and automate energy conservation. For example, air conditioning can be automatically powered on or off in response to changing light.

In an on-campus pilot, Huawei saved 455,000 kWh of electricity a year in a four-story office building with a total floor area of 5,000 square meters: 125,000 kWh in lighting, 250,000 kWh in air conditioning, and 80,000 kWh from other sources for an annual savings equivalent of 165 tons of coal, 436 tons of CO₂, and 29 tons of SO₂ and other greenhouse gas emissions. If installed across China — enterprise and commercial campuses, and school buildings — the solution could save upwards of ten billion kWh of electricity each year, conserving millions of tons of coal and dramatically reducing PM 2.5 particulates in the atmosphere.

Data captured during the trial is being used for future energy conservation and emission reduction projects as a reference for helping customers with their investment choices for energy conservation measures.

**21st Century Smart Manufacturing**

The Economy and Information Department in China’s Zhejiang Province recently encouraged enterprises to implement Internet of Machines (IoM) initiatives. It suggested the following IoM devices be incorporated into the network: Computer Numerical Control (CNC) machine tools, industry-specific devices, large machinery, and in-plant auxiliary devices.

Networked CNC machine tools are essential in the automobile, steel, building materials, machinery, and electronics industries. A CNC machine-tool network links all necessary equipment, including hydraulic machinery and cranes, for the centralized management of all procedures, and promotes the use of agile manufacturing models.

With Computer-Aided Design (CAD), Computer-Aided Manufacturing (CAM), and IoT-capable platforms in place, enterprises will become paperless digital factories, with end-to-end design, fabrication, and production processes. Industry-specific platforms will include networked support for textile, clothing, plastics, chemicals, building
Most IoT applications today remain siloed in specific industries or inside individual enterprises. To promote IoT within the enterprise, industries must focus on three aspects of IoT networks: device compatibility, service deployment, and collaboration.

**IoT and Open Co-operation**

Most IoT applications today remain siloed in specific industries or inside individual enterprises. These applications have proprietary protocols, standards, and platforms that are incompatible with, and isolated from each other, making information difficult to share, collect, or analyze. To promote IoT within the enterprise, industries must focus on three aspects of IoT networks: device compatibility, service deployment, and collaboration.

**Multiple protocols:** Currently, sensors and terminals from multiple vendors co-exist on IoT networks. Because these endpoints use different communication interfaces and protocols, connecting them to IoT networks remains challenging. To facilitate device access in complicated and diverse network situations, IoT suggests open, embedded communications modules or gateway devices that support multiple communications interfaces and protocols.

**Open networks bring new capabilities:** Deploying IoT requires new services and applications; however, traditional network devices generally have fixed services and limited functionality. Long development cycles and difficult service adaptation with traditional devices complicates new IoT deployments. A network controller platform presents a viable solution by easily responding to new service rollouts, on-demand service deployments, and flexible application releases, as needed.

**A win-win collaboration for the industry chain:** Stakeholders in the IoT industry chain include terminal chip manufacturers, sensor vendors, gateway equipment providers, network operators, service integrators, service providers, and end customers. These individual stakeholders cannot compete aggressively in global markets without extensive collaboration.

To advance the standardization and development across the IoT industry chain, IoT alliances, open software architectures, and open-source communities are helping to promote partnerships, stakeholder collaborations, and cross-vendor and cross-industry applications.

### Agile IoT is a Win-Win Solution

IoT application silos are contrary to IoT value creation. Agile IoT is a Win-Win Solution

*An open, shared IoT ecosystem must be created that encourages development across the entire IoT industry chain.*

As a committed contributor to the IoT supply chain, the Huawei Agile IoT Solution creates an open, shared, flexible IoT platform that consists of software and hardware gateways that are accessible to customers and partners. The hardware platform also supports software-defined IoT deployments for quick responses to service changes and evolutions.

Success cases include, Huawei and ChinaSoft International partnering to build an upper-layer application system, and Huawei and Wahan Fenjin Electric Power Technology Co., Ltd. collaborating on networking smart robots and IoT terminals. Huawei also helped a large tobacco company in China deploy Industry 4.0 applications as part of an effort to reinvent the company’s core production and execution systems.

Combining components from both Huawei and its partners, in Huawei’s private trial, BEMS provided valuable data for managing energy efficiency on a large enterprise campus. At the University of Melbourne in Australia, energy costs were reduced by 30% when using the BEMS solution.

As a company that is dedicated to enriching life through a better connected world, Huawei understands that IoT is paving the way for that reality. Higher levels of intelligence, lower energy consumption, and widespread connectivity are key enablers of this approach. And as the cost of sensors, cameras, chips, and radio transceivers continues to drop, the qualities of automated efficiency, integrated ERP and SCM, and the collection of feedback will continue to improve communication between people, people and things, and things themselves that creates increasing value for end-users and enterprises far and wide.