NEW TECHNOLOGICAL AGE

The Next Big Step: "The Internet of Things"

And the winner is: Germany

By Jürgen Kluge

The idea is not that new. In fact, some 15 years ago a brand manager at Procter & Gamble became interested in RFID (radio frequency identification) tags to help manage the supply chain. Kevin Aston shortly after moved to MIT (Massachusetts Institute of Technology), helped to start the RFID research consortium, now called Auto-ID Lab and is currently behind a company developing home automation systems. Now the time seems ripe for a new era. The dawn of the "Internet of Things" is rapidly approaching. The next development stage – not to say revolution – of the industrial age.

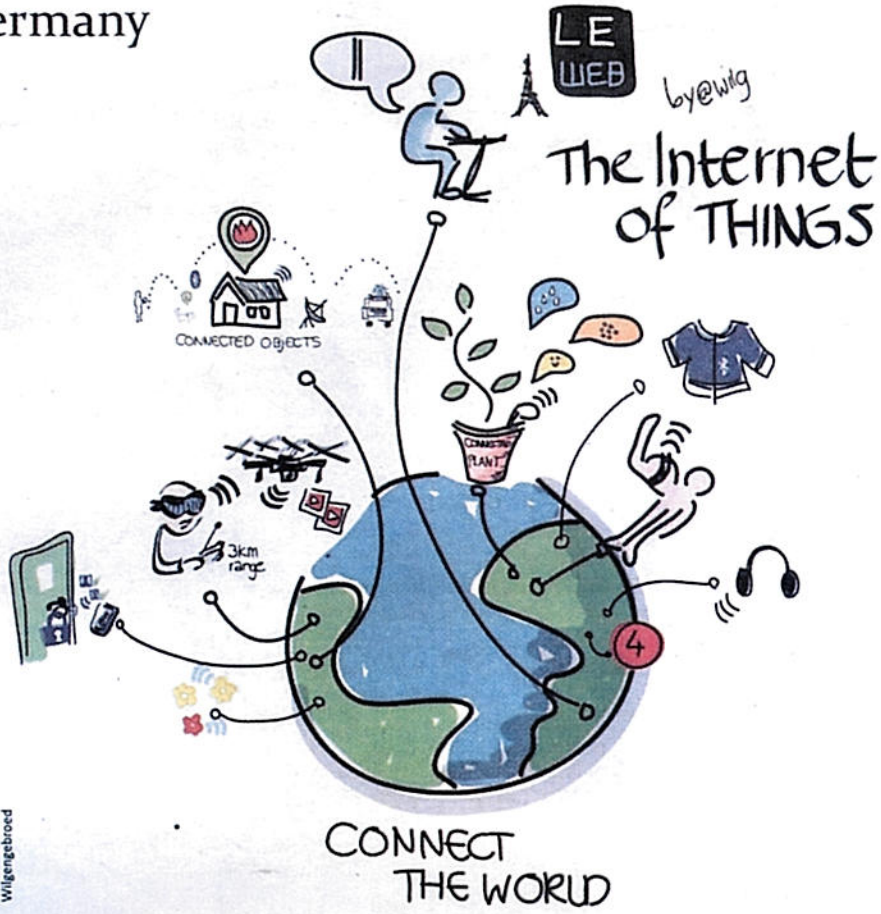
Three drivers joined

Three drivers work together to make it all possible: To begin with, there is Moore's law, still unbroken. Every 12–24 months the power of integrated circuits (IC's) doubles. An exponential law with close to unbelievable power. You might remember the old myth of the inventor of chess who demanded from the Emperor a grain of rice on the first field of the board, 2 on the second, 4 on the third and so forth.

Secondly, we have Metcalf's law. A rule of thumb on the value of networked communication systems. It scales with N^2, N being the number of participants. One fax machine, one mobile phone and the like are not of much use, a few hundred thousands are, let alone billions of devices in use or shortly envisioned.

And finally, there are Big Data Analytics with more powerful software and computers to run on. If it is possible to search the telecommunication traffic of whole countries, what else could you do? SAP's HANA software introduced in 2010, utilizes in-memory computing technology to provide real-time data and analysis, is maybe a better and more business-type example.

The self-enforcing interaction of these three trends basically drives computing power and storage to infinity and computing costs to nearly zero. Opening up the possibility to integrate small computers into nearly everything from garments to spare parts, from raw materials for machinery to the machines that do the processing, from logistic containers to – yes – your refrigerator. Tens of billions of things will be connected in the "Internet of Things."



Infinite computing storage

Which industries will be affected by the change? Nearly all, could be a reasonable answer. A few examples will suffice: To begin with, utilities: Smart meters for electricity and water/gas will enable a smart grid to better manage our resources. In insurance, telematics will lead to more accurate risk pricing. Where capital goods, factory automation, and automobiles are concerned, process optimization, reduction of down time, a new generation of Toyota's famous lean manufacturing at unheard of levels of complexity. And smarter, faster, and cheaper logistics will help facilitate transportation. And on and on and on.

In any kind of production, the old advantages of large scale can now be realistically combined with a customer specific production in minimal lot size. The race for domination of the next industrial area is on. Who are likely to be the winners? The "old" manufacturers of equipment and system solutions like the Siemenses and General Electrics of the world with their long and deep understanding of their industry and customers or the IT-companies coming from the chips and software corner? Who is going to set the open standard for the next years?

The Internet of Things is the extension of the Internet into the real world. It connects everyday objects with the Internet and integrates them into the web. Things can thus be augmented with information or can serve as access points to the Internet with ample possibilities for applications

There might be an answer that sounds slightly against the odds and the zeitgeist. But a similar, hence much smaller example might tell. When 30 years ago the laser found its way into industrial applications, the big winners were not the scientific, R&D-driven US laser companies from Silicon Valley but rather the "old" metal cutting companies. They adopted the new technology very rapidly and had the in-depth understanding of customer and application.

And, the added value for any industrial product manufactured for years and decades – like a machine tool, a turbine, a car – will stay and not decline as rapidly as the added value from software or electronics. We will still need machine tools to manufacture physical things, turbines to power planes, and cars to ride in. And yes, they will become intelligent, connected, networked and smart, but they will remain physical goods and keep most of their added value. So chances are that a GE or Siemens will still be around in 20 years might be much higher than for an Apple or even Google. Maybe a reason why even Google is contemplating to enter manufacturing of physical goods like cars.

If the future develops in this direction, there is a good chance that Germany might be on the winning side. Not having given up "real" manufacturing with a skilled workforce and a sophisticated industry structure of large and mid-sized companies, spending many R&D euros in this field, it could be the place where part of the revolution will be taking place.

It takes speed and allies

And it's already happening. At the recent opening of the world's largest trade fair in the field of technology (Hannover Fair), the word was out that the German industry has a two-year lead in this field. "Wir müssen uns sputen ..." (we have to hurry up ...) was the message by German Chancellor Merkel at her traditional walk around the fair. The *Frankfurter Allgemeine Zeitung*, a major German daily newspaper, ran an article titled "Moore's law is threatening the German industry" and made the point in the subtitle: "For Germany it's the greatest chance in the 21st Century."

What is needed to take the chance and succeed for Germany? First of all: Speed, speed and again speed to set the example, and finally the standard. Then new alliances are required, e.g. with IT rich countries like Israel or Finland. One with a proven and smart start-up scene, the other with the fertile remainder of the Schumpeterian creative destruction of Nokia. And last but not least: well educated and trained people.

The challenge is clear; Germany will work on it and come up with smart and reliable solutions. Wasn't "Fortschritt durch Technik" a German claim? ■

Jürgen Kluge is a Senior Advisor to Bank of America Merrill Lynch. He is a Professor of Mechanical Engineering at the Technical University Darmstadt