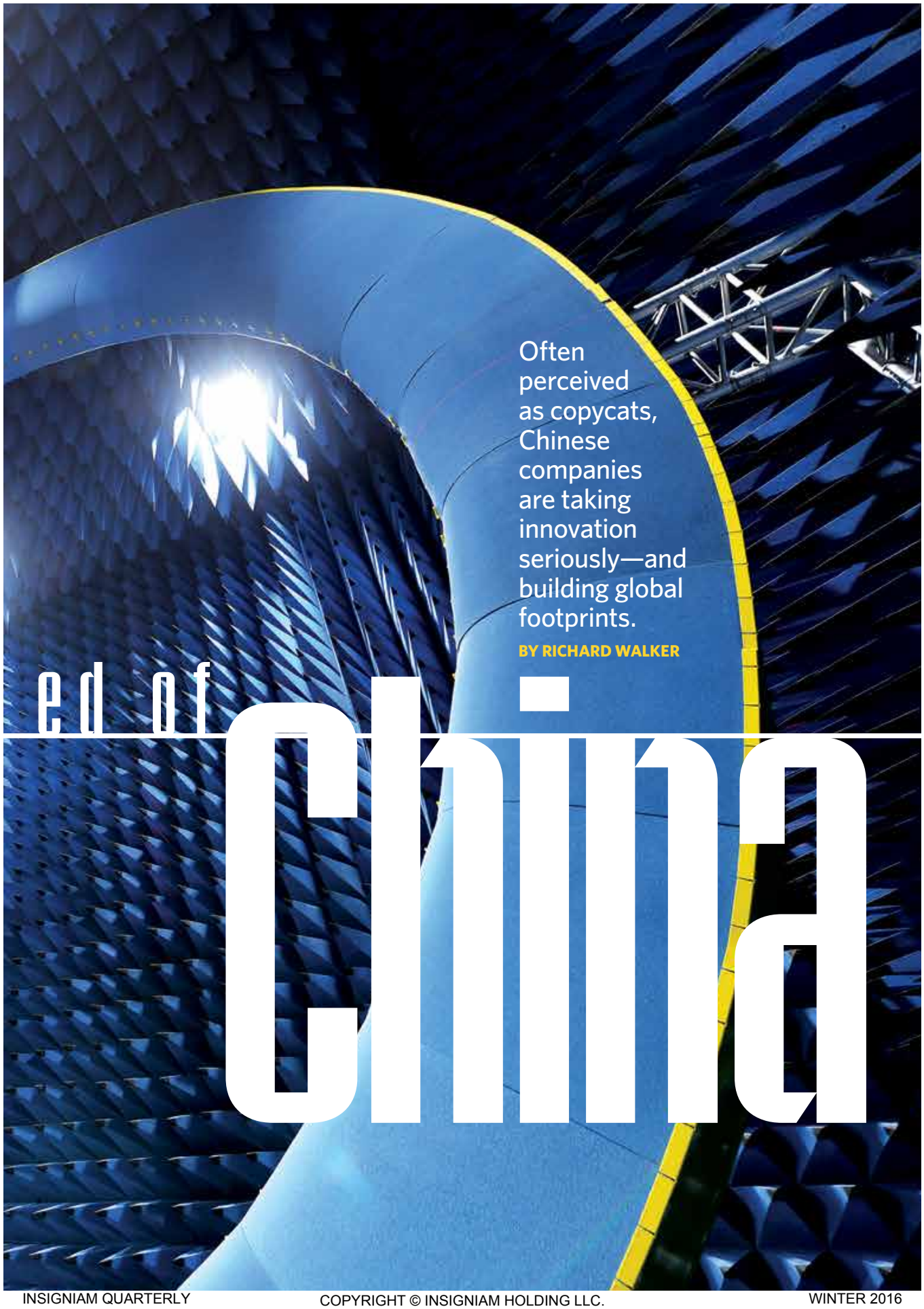

A researcher works in a testing room at FiberHome Technologies Group in Wuhan, China.



Often perceived as copycats, Chinese companies are taking innovation seriously—and building global footprints.

BY RICHARD WALKER

# ed of China

# China is often seen as one large copying factory.

taking technology from wherever it can find it—legally or not—to duplicate products and processes laboriously and expensively developed elsewhere. The country's manufacturers let others carry the burden of innovation while reaping royalty-free profits—or so the story goes.

But inside China, the view is very different: Chinese businesses see themselves as natural innovators, not only copying but also adapting, refining and improving what the rest of the corporate world does while restoring China to its rightful status as the world's most creative corporate economy.

"It's true, many Chinese companies still perceive themselves as lagging on a global basis," says George Yip, professor of strategy and co-director of the Centre on China Innovation at China Europe International Business School. "But Chinese companies understand the value and power of innovation. They are aware of where they stand in the hierarchy of global companies and the path they have to follow to rise up that hierarchy."

But the path that ambitious Chinese companies follow is rather different from the one taken by many dominant Western companies, which see themselves as technology innovators. "The old pattern in the classic Western technology company is to say, 'We are the technology creator, we are the vendor, we give the customer the technology—and the customer has to follow us,'" says Wen Tong, head of wireless technology research and innovation at Huawei. The company is the world's largest telecommunications manufacturer, with $46.5 billion in 2014 revenue and more than 170,000 employees worldwide.

"For us, it is different. If it is a matter of technology innovation, the final success criterion is market success," Tong says. "If you have brilliant technology that is not demanded by the market and doesn't create value for the customer, then we don't consider that to be innovation in our industry."

It's part of a philosophy that sees technological change now happening so fast that companies cannot plan ahead for a predictable future in the way they may once have done. "If you look at areas like wireless communication, we just don't know what applications are going to be successful in the next generation of technology," Tong says. "We have no way of knowing what the market will look like in 20 years and no way of knowing what the big revenue generators will be. What we do know is if we can actually imagine and build the foundational technology for the next era, then that will be what sustains the future."

## A TROUBLED COMEBACK

The Chinese can point to a long history of invention and innovation. In the 11th century, the most advanced piece of applied technology in the world could be found in the city of Kaifeng, one of the former capitals of China. The 40-foot-high clock of Su Song displayed astronomical measures as well as the time of day. It used hydraulic power driven by chain and a sophisticated escapement mechanism far more advanced than anything in the West. China also invented a range of agricultural tools such as cast plowshares and wheelbarrows, as well as paper, explosives, lacquer, synthetic pharmaceuticals and movable type—all before the 14th century.

Exactly why China fell behind the West in scientific research and product innovation is hotly debated. But for many Chinese, the point is that there is nothing remarkable about the idea of China as a world innovation leader. The Chinese have been there before, and many assume that soon they will return.

China's "open door" policy designed to encourage investment and technology transfer was unveiled by leader Deng Xiaoping in 1978. The first foreign manufacturers in China were attracted by very low labor costs and attractive tax and customs treatment in what remained a largely agricultural economy. The last thing they expected was to be faced with competition from Chinese companies trying to undercut them, first in China's domestic markets and then in the global market. However, that is what quickly happened. In Shenzhen, for example, the first of China's special economic zones, manufacturing companies expanded 24-fold between 1980 and 1984. Many of the new companies were Chinese manufacturers trying to reproduce what foreign manufacturers did but at a lower cost.

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This first wave of Chinese manufacturers was known as "shanzhai," meaning "mountain bandits." "These shanzhai companies started with nothing but a desire to emulate what already existed," Yip says. "They copied brand-name products, from fashion accessories to phones. Sure, the products were cheap, and the quality was low, but customers did not much care so long as they were affordable."

The mountain bandit companies took Western companies by surprise, used as they were to long product development cycles and painstaking market research. Simple and imitative as their early products were, the mountain bandits established a pattern that has remained characteristic of China's corporate innovation philosophy. "Established global companies in China are often quite surprised at the speed with which local companies introduce new products to the market," says Yip. "The product may not be perfect, but it doesn't need to be—the Chinese just gauge customer reactions, and the product can quickly be succeeded by an improved model."

As Chinese companies have grown larger and more sophisticated, the earliest approaches to innovation continue to resonate. "Chinese corporate innovation is different from the Western approach in a lot of ways," wrote Bruce McKern in a draft of a forthcoming book, *China's Next Strategic Advan-*

*tage: From Imitation to Innovation,* co-written by Yip. McKern is a visiting fellow at Stanford University's Hoover Institution, specializing in innovation in China and the strategies of emerging multinationals. "For example, you will see the deployment of large numbers of staff to solve problems, and you will see companies working their staff harder," the book says. "They also do a lot of fast trial and error—the idea is if you are going to fail, fail fast, learn and improve."

Chinese companies are more tolerant of failure than their Western competitors, and that may be because their domestic customers are also tolerant of failure. "Chinese consumers are fast-adopting, fast-maturing," Yip says. "At the innovative end of the market, the customers are often e-consumers, they often create micro-niches and they have a 'forgive and forget' mentality."

## Measuring Up

Many leading Chinese companies are still a long way from the kind of innovation practiced in the world's top technology companies—the kind of organizations that Huawei competes with. But these companies do practice innovation on multiple fronts—not just in incremental cost-cutting on established products and technologies but also on business processes and science-based research designed to bring entirely new products to market. Still, China has not yet managed to home-design a commercial internal combustion engine or create a new product category like the smartphone or grow a premium brand that speaks to the global market. Is China really up to the modern challenge of innovation?

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"You have to remember that there are some incredible minds in a company like Huawei," says Professor Rahim Tafazolli, head of the 5G Innovation Centre at the University of Surrey in the United Kingdom, where Huawei is a leading corporate partner. "But the most important thing about the Chinese is they always want to work on the most ambitious and innovative things. For them, the whole point of collaboration is to find ways of bringing the most ambitious ideas to the point of implementation."

Bjorn Debaillie says the Chinese have already proved they are highly adept at collaboration. "The Chinese have much more of a driven innovation mentality compared to the Europeans," says Debaillie, a senior researcher at IMEC. The not-for-profit micro-electronics research institute in Belgium partners with Chinese companies, including Huawei, on next-generation communications technologies. "They seem to have more ability to do collaboration, and that is helped by the fact they have the capability to think very long-term and invest over a much longer time period."

Yet according to a recent research study

from McKinsey & Co., the contribution of innovation to GDP as measured by multifactor productivity in China has been falling. Multifactor innovation contributed almost half (40 to 48 percent) of GDP growth in the decade to 2010; in the following five years, it has contributed only 30 percent. However, multifactor productivity includes a wide range of change innovation factors, such as alterations in the structure of the economy, the cost of materials and the cost of capital. The shift of a large proportion of the labor force from low-productivity agriculture to higher-productivity manufacturing must account for part of the increase in multifactor productivity.

The decline in multifactor productivity's contribution to GDP is not a sure sign that product and business process innovation is declining in China. But it does ring a warning bell that the GDP benefits of structural change in the Chinese economy may be waning and that more creative innovation may be needed to drive the economy forward in the coming years.

## Investing in Innovation

In the past, Chinese companies have tended to innovate around their understanding of their market and their ability to take costs out of existing products and processes. That is a result of their tendency to prioritize customer needs over innovation for its own sake, McKern of Stanford says. "Chinese companies have very different approaches to the relationship between innovation and the market, to the organization of change," he says. "They have learned how to innovate more cheaply than their global competitors, and they have also learned to build innovation processes in collaboration with their customers and to do it faster than their Western counterparts."

But have they begun to develop the capacity for science-based innovation, the most chal-

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## Huawei: From One-Room Startup to Dynamic Industry Leader

Almost 30 years ago, an ambitious Chinese engineer named Ren Zhengfei had an idea for a new telecommunications product—a telephone switchboard aimed at small businesses. There was nothing revolutionary about the device, apart from the fact that it would be the only switchboard in the market that was designed and manufactured by a Chinese company.

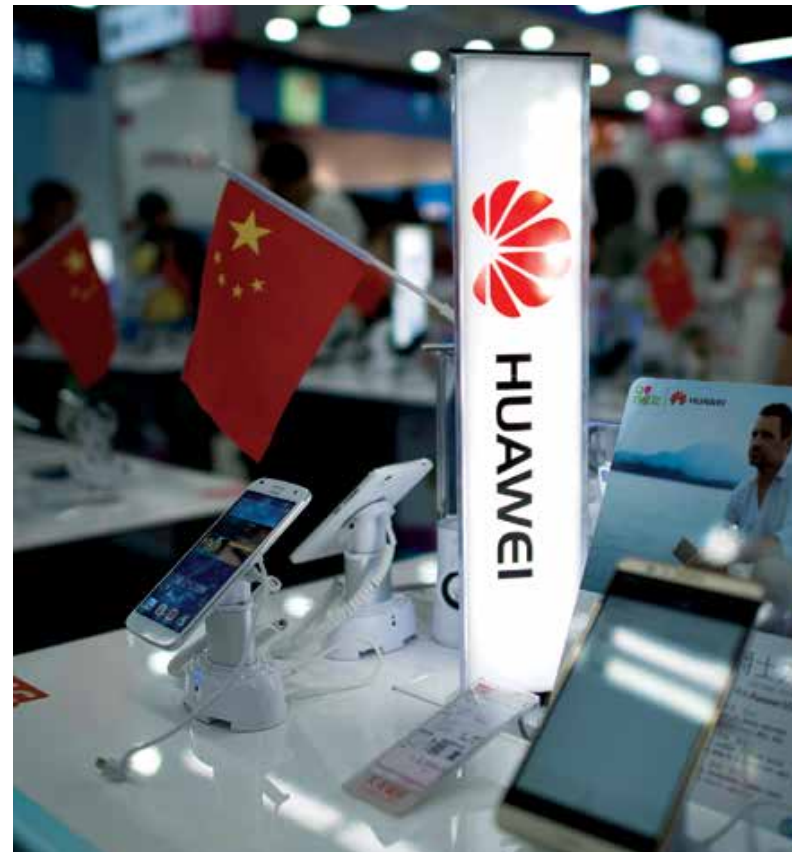
It had been only 10 years since China had inaugurated its "open door" investment policy, and the Chinese manufacturing economy was still entirely dominated by foreign companies with access to technology the Chinese could not hope to match. Innovative Chinese startups like Ren's company were not unusual—in fact, there were a surprising number of them—but they were invisible as far as most established foreign companies were concerned.

Ren and some bright telecommunications engineers designed and manufactured the modest new product, working from a single room that doubled as kitchen and dormitory. But competing with international telecommunications companies was a long, hard road. The switchboard sold, but many of the team's subsequent products did not do so well.

China's emerging generation of telecommunications engineers were good at product design, but not so good at matching their ideas to the market. Eventually, Ren had an epiphany. He and his colleagues had spent their time thinking about products. That was wrong, he decided. He needed to think about customers. From that point on the business—if it survived—would only manufacture products that exactly met the special needs of telecommunications customers. This was what Chinese-style innovation should mean, thought Ren.

The company he founded was called Huawei. By 2012, when had overtaken Swedish Ericsson as the world's largest telecommunications manufacturer, it counted 45 of the world's top 50 telecoms as customers. Ren had already been ranked by *Fortune China* as the most influential business leader in China. The company is now one of the world's biggest filers of new product patents, flowing from the company's research and development centers in Europe, the U.S., Russia and India, as well as China itself.

In the space of a generation, Huawei has evolved from a tiny provincial operation into one of the world's most dynamic corporate innovators.




lenging and potentially the most profitable form of change in economies? Yip believes they have, and points to the increasing levels of investment that Chinese companies have made in foreign technology-rich companies. "The fact is that in contrast to China's engagement with the rest of the world, much of Chinese investment in Europe is in manufacturing and services," Yip says. "This is driven by Chinese companies looking for new markets outside China."

Yip says technology acquisition is now a prime driver of Chinese corporate investment, citing companies like computer-maker Lenovo, which recently bought Motorola Mobility, and automaker Zhejiang Geely, which acquired Volvo from Ford. Perhaps more important than these wholesale corporate acquisitions is the growing Chinese investment in R&D capacity outside of China.

White goods maker Haier, for example, has acquired leading-edge refrigeration technology, primarily from the German company Liebherr, U.S. toolmaker Black & Decker and New Zealand's Fisher & Paykel. It now operates a decentralized, worldwide innovation process. Self-managed teams set their own key performance indicators and are filing about 300 patents each year.

"The essential part of innovation is that it is customer-centric."

**—Wen Tong**

Huawei says almost half its employees are engaged in some form of R&D. The company now has more than 20 R&D centers located around the world, with locations including Silicon Valley, Germany, Italy, the U.K., France, Finland, India, Taiwan, Singapore, Ireland, Russia and China. This global capability has been long in the making: As long ago as 1999, the Chinese company began working with

## Four Types of Business Innovation

McKinsey categorizes business innovation in four ways—three of which China has mastered.

1 **Efficiency-driven** innovation involves process and input-cost improvements. China's low labor cost advantage may be eroding—average minimum wage in China is now around twice the level in competitors like Vietnam—but Chinese companies have also shown they are experts in cutting production times and the costs of manufacturing processes. This is particularly evident in the innovation process itself; for example, the star product of the leading Chinese medical products company Yuwell is an electronic blood pressure meter that took three months to develop from conception to final product.

2 **Customer-focused** innovation is also natural territory for Chinese companies. It means solving the needs of customers through both novel products and business models. In China, being close to customers can mean anything from creating products like the slightly bizarre (but very successful) washing machine created by white goods giant Haier that can clean raw vegetables, to the kind of customer-led innovations that Chinese telecom company Huawei has become known for. In 2003, for example, Huawei was part of the supplier network for Dutch KPN (the national telecom provider), which was then building up its 3G mobile network. The Chinese company realized that while technology of the 3G base stations being installed around the country was not an issue, the size of the stations was. Huawei devised a way of splitting the base station components into two, making them easier and cheaper to install. Today, Huawei has one-third of the global market for these installations, and its base station design has become the industry standard.

"Chinese companies are buying the market access and the brands for competing in Western markets, as well as technologies they may still lack to round out their innovative capabilities."

**—Wen Tong**

PHOTO BY JOHANNES EISELE/AFP/GETTY IMAGES

IBM to implement an integrated innovation process, one that has taken Huawei a long way from its one-room beginnings.

Huawei believes the customer-centered innovation approaches it favors may be more important than science-based innovation. (See sidebar: "Four types of business innovation.") "The essential part of innovation is that it is customer-centric," says Tong. "The technology and innovation has to be built around customer needs and creating value for the customer. We know that there are always going to be other companies that can offer a cheaper solution. Our approach is different, to offer the best technology and value for the customer. You can have really brilliant technology, but if it is not good for the customer, if it does not address the market, there is no point."

According to Stanford's McKern, the pattern of Chinese foreign investment demonstrates that major players in China are already shifting away from natural resources to the intellectual resources needed to build future technologies. "The received wisdom is that Chinese corporate investment abroad is all about acquiring primary resources in emerging economies," he says. "While that has been a prime motivation in the recent past, today the reality is rather different—Chinese companies are buying the market access and the brands for competing in Western markets, as well as technologies they may still lack to round out their innovative capabilities."

Their ambitions run higher than mere acquisition. Huawei, for example, runs a unit the company calls the Beethoven Lab—named after the deaf composer because Huawei wants the laboratory to be deaf to received wisdom and to work on what the company calls "stupid ideas." These are the future technologies that Huawei believes will one day seem a lot less stupid.

The spending of vast sums by Chinese companies on imagining the future is a gamble. But the record so far suggests that many of China's innovation gambles have a way of paying off in the long term. **IQ**

**3** **Engineering-led** innovation is based on the ability to integrate technologies, the kind of innovation that aerospace and automotive companies use to gain competitive advantage. China has a record of innovation achievement here as well, in areas like the high-speed trains developed by the engineering companies CSR and CNR (which are currently in the process of merging). Chinese companies have built thousands of miles of high-speed railway using technology from Mitsubishi, Hitachi, Alsthom and Siemens, among others. The high-speed rail network has gained considerably from Chinese government investment, with $300 billion of spending projected by 2020. As McKinsey points out, successful engineering-led innovation in China tends to require substantial state backing.

**4** Where Chinese companies have not succeeded in making a global impact is in **science-based** innovation—the kind of innovation that requires long-term investment in R&D and the kind of capital resources that can support product lead times of 10 or even 20 years. McKinsey points out that industries such as pharmaceuticals, bio-technology and semiconductor design may spend up to a third of their revenues on R&D and have the kind of capital reserves and long-term shareholders to support product development over decades.