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ASSET MANAGEMENT

Sustainable Investment Spotlight

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- Technological progress and economic growth have triggered an unprecedented expansion phase of robotics adoption and applications across sectors.
- Continuous innovation in automation, big data and software analytics will strengthen the case for robotics and open new business perspectives.
- Fears of mass unemployment are overdone, but sustainability challenges exist and have material implications for the value and potential of technology enablers and adopters.
- Most attractive investments are currently found within the concentrated industrial robots segment as well as in the IT-related space or through Tier 1 / 2 manufacturers.

Living among robots

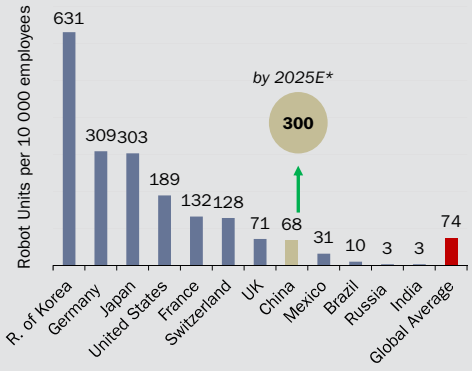
Robots are moving beyond manufacturing

By 2025 the global market for robotic systems is expected to reach USD 87bn (Boston Consulting Group), with a similar amount coming from AI-based analytics, sensors and lasers as well as from vision, control and communication systems. The main adoption and growth drivers are falling prices, wage inflation and continuous technological improvements. Robots will not only be used in the traditional industrial sector, which was the earliest adopter of robotics technologies, but increasingly in new areas across the consumer and commercial space. Hence, the global market for robotics can be classified into (i) ***industrial robots*** and (ii) ***service robots.***

Industrial robot density is rising globally

The adoption of robotic solutions continues to grow as automation activities allow businesses to enhance performance by minimising errors, increasing quality and speed, and in some cases even achieving results that exceed human capabilities. Indeed, the global average robot units per 10,000 employees, which highlights the automation degree of the manufacturing industry, is reaching new highs every year (up from 50 units to 74 between 2010 and 2016). We expect this trend to continue unabated, with an average robot density close to 100 units by 2020. For the same period, the IFR (International Federation of Robotics) expects the market size for industrial robots to be above USD 30bn (today USD 14bn) with a global installed base reaching 3.0m units, up from today's 1.8m (Compounded Annual Growth Rate: 15%).

Chart 1: Industrial robots - 74 units is the new record-high robot density average

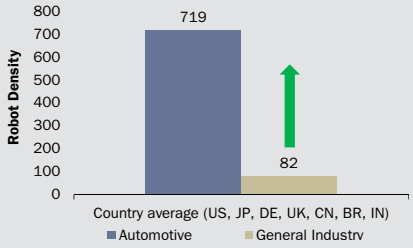


Source: Bank J. Safra Sarasin, IFR, 2018

China, currently the world's largest market for industrial robots with around 30% of global demand but only 23rd in terms of robot density, will be the leading growth driver for this market (Chart 1). In 2015 the State Council launched its "Made in China 2025" strategy, aiming to upgrade the manufacturing industry, focusing on technology and innovation with an emphasis on quality over quantity. The country's objective is to be one of the world's leading manufacturers in key industries such as telecommunication, railway, electrical power equipment, electric vehicles and robotics. By

2025 the target is to reach a robot density of 300 units (CAGR of 18%), which would imply China catching up to highly automated nations such as Germany and Japan, and surpassing the US.

Chart 2: Robotics penetration in the automotive vs. general industry



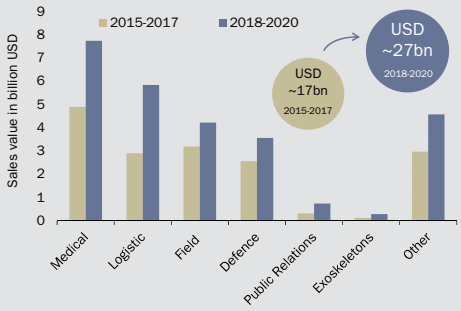
Source: Bank J. Safra Sarasin, IFR, 2018

Not only in China will the average robot density continue to increase as there is significant catch-up potential of the general industry (Chart 2) and of other emerging markets.

Service robots are booming!

Robots are not only gaining ground in the manufacturing sector, but also in other environments from healthcare, logistics or agriculture through to households and entertainment.

Chart 3: Adoption of professional service robots across the board

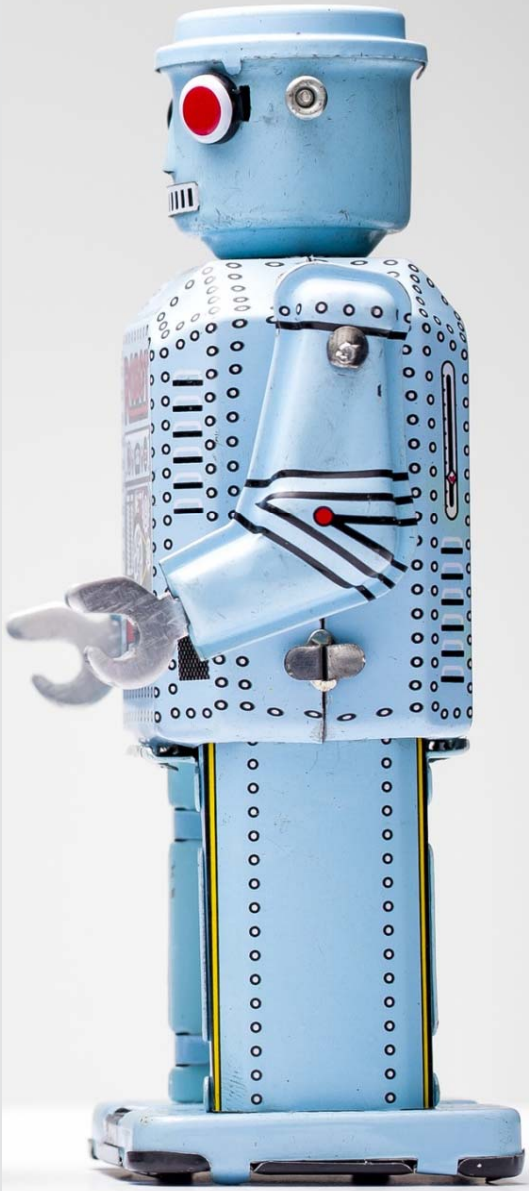


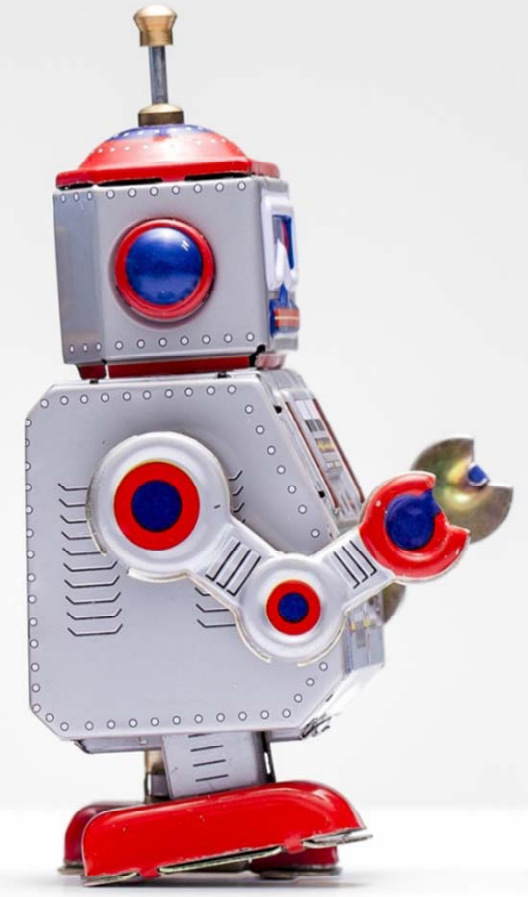
Source: Bank J. Safra Sarasin, IFR, 2018

Professional service robots are indeed expected to outgrow industrial robots, with an implied CAGR of 25% for the coming three years, reaching USD 27bn by 2020 (Chart 3). Medical robotics and computer-assisted surgery systems will reduce the variability in surgeons' skills, improve patient outcomes and minimise invasive procedures. Medical robots offer consistency in functionality, swift post-surgery healing and reduced long-term costs with the potential of decreasing the economic burden on the healthcare system. Similar meaningful impacts can be expected in other fields. In bionics, promising developments are being made with smart prosthesis and exoskeletons reinforcing human capabilities. In logistics, advanced robots have entered warehouses and logistics centres with capabilities in sorting, picking and packaging, thereby increasing efficiency, accuracy and safety. New generations of autonomous robots are also being introduced in the agricultural sector with capabilities ranging from precision crop seeding, weeding and spraying to fruit harvesting, "milkbots" and self-driving tractors.

The market for ***personal service robots*** is currently the smallest (around USD 3bn), dominated by household robots for domestic tasks. It is however the most dynamic one and will offer the highest growth rates. In 2017, The Boston Consulting Group had to revise their 2025 estimates sharply upwards from an original USD 9bn to 23bn. As technology improves and robots get "smarter" numerous new fields and areas of application will emerge. In addition to connected service robots being used in "smart homes" for lawn-mowing, vacuum or floor cleaning, we are seeing care bots being implemented in nursing homes or even humanoid robots being designed to live and interact with humans. "Biscuit", a robotic dog at a residential house and dementia care home in the UK, is equipped with sensors in various places on its body that allow it to respond appropriately when a human interacts with it. Similar robotic animals have been introduced in Japan. In most cases the outcome has been an improvement in the quality of life for nursing home residents and patients. More service robots are being developed to support medical care professionals, which assist frail residents to get out of their bed and into a wheelchair, or that can help elderly or disabled people get into bathtubs.

Service robots across sectors





Artificial intelligence as enabler for the next level of robotics

Digital technologies are driving innovation in industrial markets towards Industry 4.0. Within the manufacturing sector, the goal is to link real-life factories with virtual ones, creating an ecosystem where vision and sensing devices are coupled with analytics platforms. In this new ecosystem, there will be a shift from electro-mechanical robots to cognitive machines.

At present, robots using deep learning are already capable of detecting the signs of a malfunction several weeks ahead of it actually happening. In the future we could see self-optimising manufacturing facilities across the globe. Robots that do the same tasks in different production sites communicate and transfer useful data to the cloud, with the ability to adapt quickly to changes in production requirements. There will thus be a shift from automated to autonomous systems. Customers will be able to launch products faster to market, as smart robots automatically download the necessary information from the cloud and optimise the manufacturing process through self-learning.

The constant technological achievements being made with industrial robots will be very useful and enable an important transfer of knowledge for the further development of service robots. While industrial robots have more limited applications and usually perform routine tasks, service robots will need more sophisticated features. Their functionality is more complex and they will need to become more adaptable and eventually acquire more human capabilities. Here is where artificial intelligence (AI) plays a key role. Future technological breakthroughs in cognitive computing, machine and deep learning as well as image and speech recognition will dictate the pace of service robots' penetration. The faster these technologies evolve, the earlier we will see a new generation of robots emerge across all sectors, having a greater impact on our everyday lives.

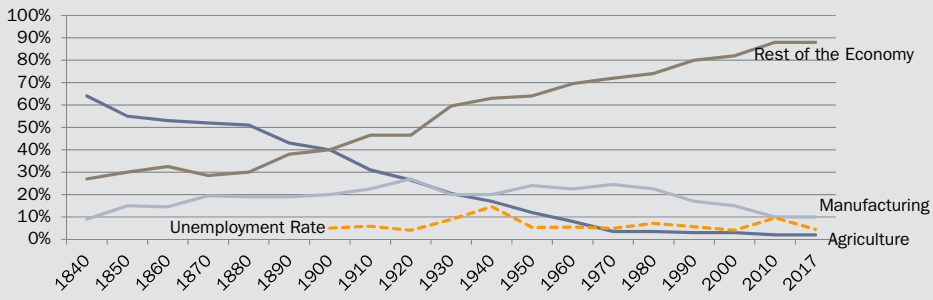
Will robots master self-learning?

Robocalypse or cyberparadise?

Technological progress might be a process, but it is mostly made visible through mediatised breakthroughs and stories framed to trigger emotions in the face of the unknown. As a consequence, technology and science (-fiction) generate dreams and fears of change long before being actually visible in everyday life. Today as much as in the past, optimists expect technological progress to bring about a fulfilling working environment where dangerous and repetitive tasks are left to robots while humans focus on creative work and enjoy more spare time. This should occur in an efficient and convenient economy where high-quality goods and services are affordable and available around the clock. By contrast, fears (re-)emerge around mass job destruction, (further) polarisation of wealth and permanent cyber-vulnerability in an interconnected world, which could all trigger a systemic crisis.

Historical evidence, however, dismisses both technological dreams and nightmares. Looking back at the first, second and third industrial revolutions, adaptation prevailed over disruption. First, the mechanisation of the late 18th century and the emergence of mass production in an electrified world one century later triggered a shift from a mostly rural world to a more urban society in what would soon be called industrialised countries. This was accompanied by a rise in real wages, but also by a degradation of living conditions until the emergence of trade unions allowing the working class to successfully claim its share of the technological dividend. Over that period, and as illustrated by the US example (Chart 4), labour in the agricultural sector indeed declined sharply, but was absorbed by the manufacturing sector.

Chart 4: Distribution of labour by sector and unemployment rate in the US



Source: Bank J. Safra Sarasin, ILO, Berkeley University of California, US National Bureau of Economic Research,2018

With the development of information technology and automation in the late 20th century, a new transition started towards a service- and knowledge-based economy with, again, a decline in employment in the dominant sector to the benefit of emerging fields. As such, according to the International Labor Organization, 30% of jobs created since the 1990s were profiles that did not previously exist (software development, IT admin, hardware manufacturing, etc.).

Finally, over 250 years of technological (r)evolutions, unemployment has remained stable and around 5%, except for periods of crisis uncorrelated with technological progress. Despite the speculation, humanity therefore did not step into a cyber heaven or hell, but pursued its evolution partially triggered or enabled by technological progress. Departing from the emotional excitement of the term "disruption" we still need to consider the implications of the 4th industrial revolution for society, and in turn for companies and investors.

As such, if companies are to harness the potential of automation across sectors, they need to distinguish between automation in a job and job automation. Current experiments in the automotive sector demonstrate, for example, that full automation of production is not the most effective avenue to achieve a mix of cost and quality objectives, despite using the very latest technology. Automation is actually more likely to support specific tasks within a work stream or job, thereby changing the nature of human intervention and freeing up time to pursue other objectives. According to the McKinsey Global Institute, automation will impact 30% of tasks in 60% of jobs by 2050. This is already visible in the restaurant industry, where companies invest in automated ordering and cooking, and redeploy their workforce to enhance service quality and customer experience.

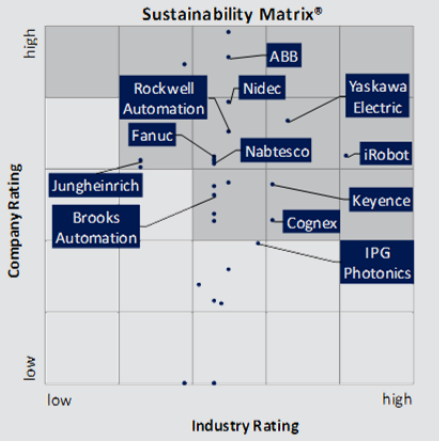
Furthermore, societal challenges must be addressed by companies sooner rather than later, as this influences the related political agenda and (re)defines the framework in which businesses operate. Today's public discussions are reminiscent of the past, with topics such as the appropriate way of sharing the technological dividend. South Korea is experimenting with the idea of a tax on robots. New ethical dilemmas emerge, for instance in the case of death caused by a self-driving car or around cyber security and privacy on the back of power-grid hacks and fake news. Of course, this does not undermine the potential of new technologies for society at large. Indeed, 2.8 million lives are currently lost every year in hazardous occupations. These jobs could be replaced or made safer by technological solutions. On a bigger scale, the rise of robots may also ease the pressure on labour and economic structures caused by demographic shifts that are slowly flipping the age pyramid on its head.

Sustainable investing in the 4th industrial revolution

Companies that are not questioning their business model or their offering in the face of technological progress are likely to miss opportunities and to be unprepared for emerging risks. The tech giants of the 1990s and 2000s, for example, have mostly been too late in embracing the cloud revolution and are now lagging in this multi-billion market, despite an initial positioning advantage. On the other hand, companies thriving on innovation without appropriately anticipating risks emerging (or being exacerbated by) new practices are exposed to major setbacks directly threatening their business models and licence to operate. Numerous recent illustrations of such risks revolve around privacy and data security issues. More are to be expected.

For investors in the 4th industrial revolution, this environment therefore requires targeting companies that both harness new technologies for the benefit of their business and understand related risks and societal consequences. In our view, the most attractive investment opportunities can be found within two main domains. The first is in the concentrated industrial robots sector, where four players dominate the high-end segment with a clear technological advantage. The second is within Tier 1 / 2 manufacturers and the IT-related space, as the service robot market is still very fragmented (700 players worldwide, 2/3 SMEs). Consequently, in order to participate in the substantial growth potential of service robots, we see specifically companies exposed to electric motors, lasers and machine vision as very promising.

Selected companies with a relevant positioning within robotics



Source: Bank J. Safra Sarasin, 2018

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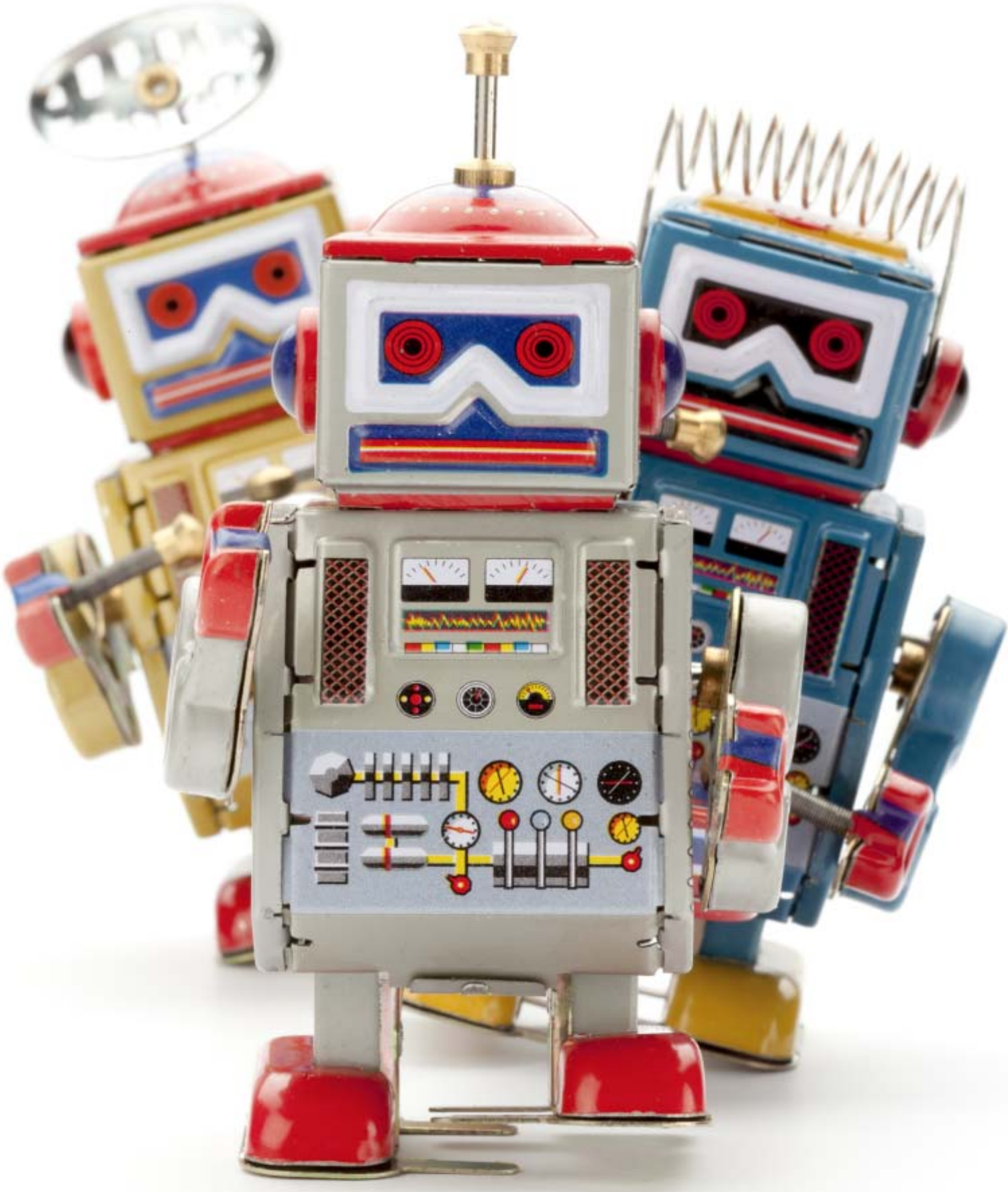

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