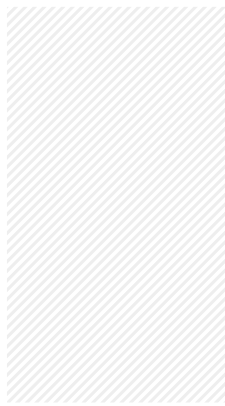


# ROBOTICS

FUTURE TECHNOLOGY EDITION

**#5** in the Series of 'Essential Eight' Tech Mega Trends set to impact all markets in the coming years



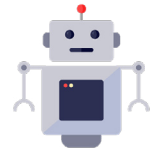
## ROBOTICS

Machines with enhanced sensing, control & intelligence which can be used to automate tasks, assist and help increase productivity of humans.

The robotics market has been growing steadily in its application for industrial manufacturing. Worldwide shipments of industrial robots reached 387,000 units in 2017, up significantly from around 294,000 in 2016, according to Statista. This growth was largely driven by the automotive sector, which accounted for more than 125,000 new robot installations in 2017. The Japanese love robots it seems: there are now 1,240 industrial robots installed per 10,000 automotive employees in Japan according to the research house.

But robotics is now poised for democratisation into a broad range of services and retail applications. Take Baxter for example: Baxter is a robot designed for use by Small and Medium-sized Businesses. It has an animated screen for a "face" that allows it to display multiple facial expressions determined by its current status. There are sets of sensors on its head that allow it to sense people nearby and give it the ability to adapt to its environment.

These sensors give Baxter the ability to adapt to its surroundings, unlike other industrial robots which will either shut down or continue running incorrectly when their environment changes. For example, if it drops a tool without which he cannot do its job, whereas some robots will continue to attempt to perform their job despite lacking the proper tool, Baxter will not continue with the job. Baxter runs on the open-source Robot Operating System on a regular, personal computer which is in its chest. Baxter can be placed on a four-legged pedestal with wheels to become mobile. It also has extra sensors in its hands that allow it to pay very close attention to detail.



Teaching Baxter: As opposed to traditional robots, which are programmed to follow a specific set of commands, Baxter can be programmed by moving its hand to perform a task. It then memorises the motions and stores that ready to repeat the task you've just taught it to do. Extra dials, buttons, and controls are available on Baxter's arm for more precision and features. While most of other industrial robots require programmers to code them over many hours, programming Baxter can be done by unskilled workers in a few minutes.

Here's 8 other things you need to know about the robotics market:..

## 1 ROBOTICS BOOM

The global robotics market is growing exponentially. Unit sales for 2016 were expected to reach 6.69m units, and for the next four years, a cumulative average growth rate of 26.5%, according to research from Technavio. It also forecasts that by the end of 2019, nearly 14m robotic units will be sold every year. The 'service robotics' market is estimated to reach \$23.90bn by 2022, at a CAGR of 15.18% between 2016 and 2022, according to a recent report by MarketsandMarkets.com.

## 2 INTEREST & INVESTMENT AT SENIOR MANAGEMENT LEVEL SET TO DOUBLE IN 3 YEARS

PwC's Digital IQ research reports that 15% of business leaders say they are making significant investments in robotics technology today; and in three years' time 31% of leaders are set to invest in robotics for their businesses, assets etc.

## 3 HIGHSTREET BANKS COULD SEE SERVICE ROBOTS

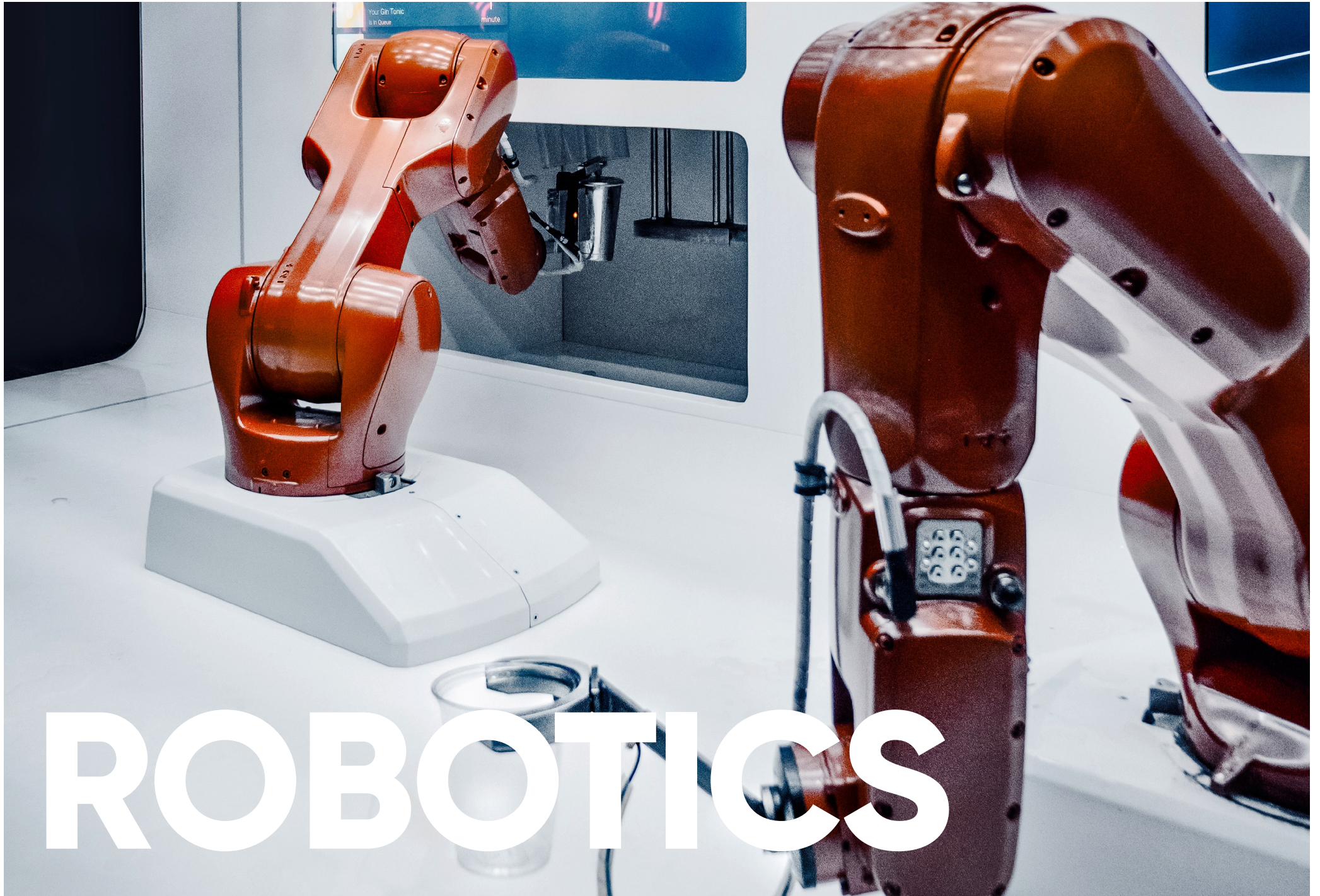
In 2015 Japan's MUFG bank introduced Nao, an interactive 'humanoid' service robot, to assist its branch customers. Nao 'speaks' 19 languages, and is available 24 hours a day to greet customers and help determine their needs. Nao is also programmed to analyse facial expressions and tone of voice to better respond to customers' requests.

## 4 ROBO-VALET PARKING

Gatwick Airport is gearing-up for three-month trial of autonomous robotic parking valets in an attempt to fit more vehicles into its car parks. Cars are scanned for their dimensions before being slotted into appropriately-sized spaces by the robots. Developed by Stanley Robotics – 'Stan' uses forklift truck-like equipment to raise cars off the ground and transport them into the tightest of spaces.







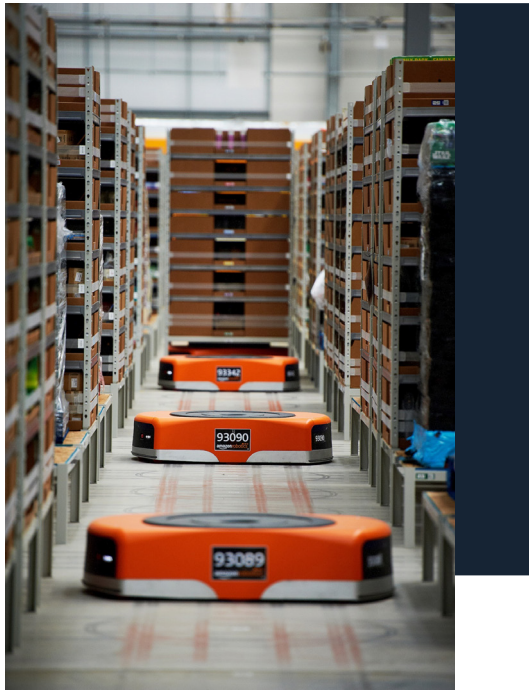
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## 5 ROBOTS IN THE AMAZON?

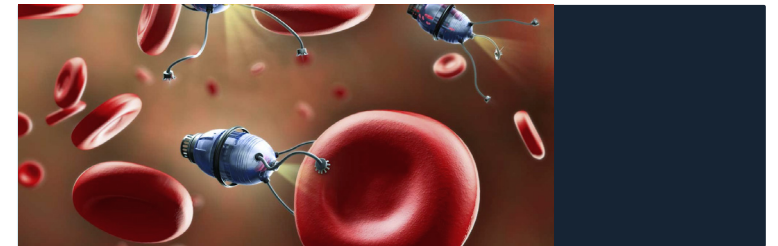
Robots are being installed in warehouses to help with movement, storage and rapid retrieval of goods. Amazon bought a robot company Kiva for \$775m in 2012 as it decided to head into the retail world more directly – later buying Wholefoods. The deal secured Amazon an army of robots custom-made to zip through warehouses, fulfilling shipment requests at a dizzying pace. By the time Amazon fully implemented the use of Kiva robots in 2014, the company had reduced the so-called “click to ship” cycle from the 60 - 75 minutes humans required to just 15 minutes, according to a Deutsche Bank note published that year.

It also saved the company 20% on operating costs. Amazon later changed Kiva's name to Amazon Robotics. It then suggested that other retailers keen to use its robotic army let Amazon Robotics and Amazon Services fulfil their orders using Amazon robots in Amazon warehouses.



## 6 NANO-ROBOTIC MEDICINE

Nanorobots are already being tested to shrink tumours in the body by cutting off the blood supply to the tumour (once detected by the nano device) itself, while allowing blood to flow around the rest of the body in the normal way. This looks much more effective and safer than current invasive surgical or radiotherapy treatments.



## 7 'DARK PLANTS' RUN BY ROBOTS

Lidar manufacturer Velodyne is set to open a fully automated or 'dark' plant next year to make these vital devices for autonomous cars affordable enough to build into mainstream car brands.



[www.dthomas.co.uk/content/fs/futuretech.shtml](http://www.dthomas.co.uk/content/fs/futuretech.shtml)

The global  
**ROBOTICS**  
market is **BOOMING**

Forecasting by end of **2019**  
**14 million**  
Units are sold every year

With an estimated  
market value  
**\$23.9bn**  
By **2022**

## IN SUMMARY

Robotics has been with us for decades, and yet it's possible that we have only just started to find its true potential as a wealth generator and a means to greater efficiencies. So, robots take their rightful place as one of PwC's 'Essential Eight' Tech Mega Trends which will reshape businesses and the world of work over the next decade.



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