Deloitte.

The Deloitte Consumer Review
Digital Predictions 2015

Contents

Foreword

Welcome to the tenth edition of the **Deloitte Consumer Review**.

In this report we look at how five digital technology trends are set to accelerate disruption in the consumer market in 2015. In doing this we draw upon our 14th annual Technology, Media & Telecommunications Predictions report and consider the implications for the consumer.

Consumer connectivity and device convergence continue to challenge and disrupt the consumer market. This rate of disruption is set to accelerate with the emergence of new digital technologies and digital platforms. Companies and consumers are also collaborating to create digital ecosystems. Understanding how these trends are developing and will continue to develop remains a differentiator among consumer businesses.

Five key digital consumer trends

1. The Internet of Things (IoT) comes of age as the number of connected devices and sensors for use in the home and in the enterprise environment grows exponentially. Deloitte predicts that in 2015 one billion wireless IoT devices will be shipped, up 60 per cent from 2014. The connected home and the connected car are two areas of focus for the medium term. In the short term we predict the majority of the growth in the market will come from enterprise use.

2. We predict that the use of drones, robotics and artificial intelligence will increase during 2015, as consumer businesses adapt to a multichannel environment, where customers demand greater stock visibility, lower prices and higher levels of service. Smarter machines and applications will be a key enabler of this shift. Deloitte predicts that in 2015, the active base of non-military drones will exceed more than one million units for the first time.

3. Mobile technology has empowered consumers by giving them access to information in real-time and on-the-go allowing them to make better decisions. It has provided a new channel for both sales and communication with customers and consumers. It has enabled the creation of new business models. However, perhaps most significantly, it has provided a platform for the integration of the online and offline worlds. Two areas of focus for 2015 will be mobile payments and the increased usage of beacons. Deloitte predicts that by the end of 2015, five per cent of the 600-650 million Near Field Communication (NFC)-enabled phones will be used to make a contactless in-store payment at least once a month.

4. 3D printing will help democratise innovation by allowing rapid, low cost prototyping. It has the potential to transform manufacturing by allowing the production of lighter, stronger components. 3D printing will also have an impact on the supply chain by facilitating the postponement of manufacturing to allow for greater customisation of products and packaging. In 2015, Deloitte predicts that nearly 220,000 3D printers will be sold worldwide with a sales value of $1.6bn.

5. Click and collect has redefined convenience by giving consumers an alternative to home delivery for online purchases. However, as click and collect develops, particularly in the number and type of locations you can collect from, it will challenge the traditional model of retail and create opportunities for others to sell directly to consumers. Deloitte predicts that the number of click and collect locations in Europe will reach half a million in 2015, 20 per cent up on 2014.

We hope this report gives you the insight and data you need to enhance your understanding of consumers and the issues facing your sector, and welcome your feedback.

Nigel Wixcey
Lead Partner, Consumer Business
Deloitte LLP

At a glance

Internet of Things: blurring the boundaries between products and services

1 billion
IoT devices will be shipped in 2015.

60%
of all IoT wireless devices are expected to be bought, paid for and used by businesses.

Longer term, the connected home will open up opportunities for manufacturers to sell directly to consumers.

Robotics and Drones: inching ever closer to the connected consumer

The market for sales of robots for logistics, packaging and materials will be worth $18bn in 2015, and is set to double by 2020.

Total industry revenues of drones are expected to be $200-$400 million in 2015.

While niche, drones are predicted to reduce the costly 'last mile of delivery' for retailers, but not any time soon.

Mobile Payments and Beacons: integrating the online and offline worlds

By the end of 2015,
32.5 million
NFC-enabled phones will be used to make a monthly, contactless, in-store payment.

In mid-2014 this figure was 2.5 million.

We predict that
15-20%
of all UK retail stores will have beacons installed by the end of 2015.

The biggest impact will be on loyalty & conversion

3D Printing: democratising innovation

Deloitte estimates that businesses will account for 90% of the value of all 3D printers.

3D printing will make it faster, easier & cheaper to design, build and test new products.

3D printing enables manufacturers to radically rethink their supply chains and encourage customisation.

Click and Collect: redefining convenience

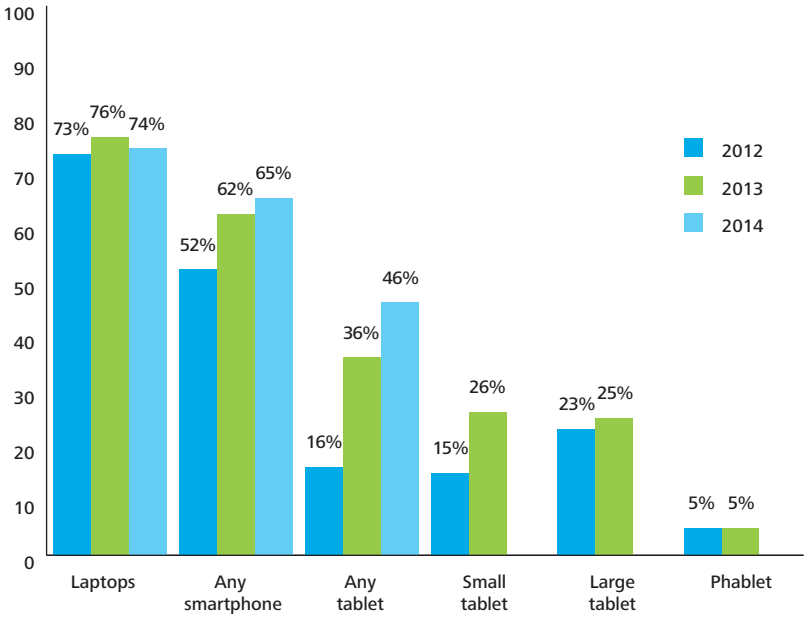
Deloitte predicts that the number of click and collect locations in Europe will increase by 20% in 2015 to 500,000 of which:

Digital technology and the consumer

In this section we look at how the adoption of digital technologies is driving a revolution in the way consumers interact with each other and engage with the companies serving them. Moreover, this digital revolution is creating an ever expanding amount of data about consumers' behaviour, their purchasing habits and their usage of digital devices.

There are important implications for businesses as they develop and invest in the capabilities required to adapt to the digital evolution of their consumers' lifestyles. The constant growth of data on consumers and the emergence of new data types such as unstructured data from social media, mean there is more information to be integrated into the decision-making process that guides operating models. This in turn helps businesses respond more efficiently and in real time to consumer demand and expectations. It is therefore critical to anticipate and understand what is coming next in the world of the digital consumer.

Figure 1. UK digital devices owned or accessed



Source: Global Mobile Consumer Survey Base: All UK respondents, n=2,000

The digital life

Growing digital device ownership

Consumer ownership of and engagement with digital technology continues to grow exponentially. The average consumer with home connectivity has six devices connected at all times and the UK has one of the highest consumer ownership of tablets, smartphones and other multipurpose devices.[1] According to Deloitte research, 65 per cent of UK consumers now own or have access to a smartphone and 46 per cent own or have access to a tablet. As a result, digital activities have become more mobile as consumers move from fixed personal computers in the home to using their tablets and smartphones while on the move.

The power of digital

Digital technologies have brought convenience and removed many constraints from everyday activities such as booking a taxi, shopping or controlling the temperature in the home, giving more power to consumers as a result. These technologies have also improved consumers' access to information and widened their choice of goods and services. They have also given them opportunities to share their experiences more widely. Empowered by social networks and digital, consumers have become more demanding. They have also been given a voice and they expect it to be heard. Consumers are increasingly dictating when, where and how they engage with brands.

They have become both critics and creators, demanding a more personalised service and expecting to shape the products and services they consume. This is disrupting the traditional path to purchase: instead of a funnel-shaped selection process, consumer journeys are now subject to interruptions, diversions and delays. Businesses need to develop tools that capture these disruptions to optimise their response and find solutions to ease the path to purchase.[2]

Digital influence in retail

With greater interaction across various touchpoints, consumers increasingly expect a seamless and integrated experience across all channels. Consumers want to use digital devices to enhance their shopping experience. To assess this changing dynamic between the consumer and retailer, in both the physical and digital worlds, Deloitte conducted a study to find out how consumers currently use digital devices at different stages of the shopping journey. Deloitte's research shows that digital is fundamental to the entire shopping experience, with three-quarters of consumers using a digital device during their most recent shopping journey. The analysis showed that digital technology is influencing 33 per cent of in-store retail sales in the UK, equivalent to £100 billion in 2014. This represents a growth of 175 per cent since 2012. In the future, digital influence is expected to continue growing and to reach 50 per cent of all store retail sales by the end of 2015.[3]

By 2022, as many as 500 smart devices might be connected to a smart home.

Beyond the connected consumer, the connected home

The fact that consumers are leading increasingly digital lives denotes that the number of digital devices owned will continue to grow. The current replacement cycle of home appliances means that new products entering the home are likely to be digital, transforming the home into a connected home. For example, in the seventh edition of the Deloitte Consumer Review: Digital Predictions 2014, we discussed the 'converged living room' and the proliferation of digital devices for entertainment in the home. The use of digital technology is starting to move beyond the living room and we are seeing growth in sales of devices for the connected home such as smart appliances, smart thermostats and lighting systems.

By 2022, as many as 500 smart devices might be connected to a smart home.[4] A majority of these, such as connected coffee machines, lawn irrigation sensors or wearables, will create demand for a wide range of consumer products and services.

Many smart home technologies are in the early phases of adoption and the time to maturity of many of the key smart home technologies is five to ten years.[5] As a result, growth in the number of connected appliances for the home will be held back by the length of product replacement cycles. However, the falling cost of smart appliances combined with wider availability will ensure that when products are replaced they are likely to be replaced by connected products.

Enterprise usage of digital devices

Every experience is becoming a digital experience. As things become 'smarter' and connected such as parking meters, health monitoring devices, light switches, thermostats, fridges or televisions, more convenience is added for the consumer by merging the physical and the digital.

As consumers become increasingly comfortable with the use of these technologies, a gap is emerging between their growing expectations and the ability of businesses to meet them. With new technologies entering the mainstream, there will be more disruptions to the traditional relationship businesses have with their consumers. Businesses that are not engaging and investing in the possibilities offered by the growth of connected devices – the so-called internet of things (IoT) – are at risk of being disconnected from their consumers.

A recent survey shows that nine in ten companies believe that the consumer experience will be their primary basis of competition by 2016 versus four in ten four years ago.[6] The consumer experience may be the most impactful area of innovation available to businesses today. Whether through the rise of 3D printing to create personalised products or delivery via drone, innovations in the consumer business sector are likely to focus on improving the consumer experience.

Such innovations will also offer businesses new and different opportunities for engaging with consumers. Businesses need to invest in developing capabilities to have more consumer-centric business. Engaging with consumers needs to go beyond the marketing function, it requires better collaboration across different parts of the organisation in managing the different touchpoints with consumers.

Businesses are beginning to see that the relationships they have with consumers or suppliers are more than simply linear. These connections are creating a network of businesses, suppliers and consumers all interacting with one another and sharing streams of complex data captured by sensors and applications. The emergence of these networks is accelerating change. Many businesses now operate in an environment of open collaboration. Such collaboration can create more value for the business and offer greater convenience to the consumer. Understanding the opportunities that will arise from greater interaction with consumers and suppliers in these networks will become increasingly important for the businesses serving them.

The Internet of Things

The Internet of Things

For consumers, the Internet of Things (IoT) represents the latest stage in a process that has seen them empowered through their ownership of and engagement with digital technology. Now, with the Internet of Things they can also interact with and influence the way that they experience products and services. Investment in developing products and services for the connected home or the connected car will continue to drive innovation and create opportunities for new products and services.

At the same time, businesses continue to invest in creating the Industrial Internet of Things by digitising their businesses: every employee, core process, product or service. For businesses, the Internet of Things means they can now access more real-time information that can allow machines as well as employees to react more rapidly and more intelligently, enabling them to become more efficient and develop better products and services.

The Internet of Things will grow rapidly in 2015

Deloitte predicts that in 2015 one billion wireless (IoT) devices[7] will be shipped, up 60 per cent from 2014,[8] and leading to an installed base of 2.8 billion devices.[9] The IoT-specific hardware (which could be a more expensive cellular modem, or a much cheaper Wi-Fi chip) is likely to be worth $10 billion,[10] and the associated services enabled by the devices worth about $70 billion.[11] Services include all of the data plans that may be necessary to connect a device over a network, the professional services (consulting, implementation or analysing the data) and then things like an insurance policy discount for a telematics device in a car or a wearable device for health purposes.

IoT hardware and connectivity revenues are growing at about 10-20 per cent annually, while the apps, analytics and services are growing even more rapidly at 40-50 per cent.[12] While the media may focus on consumers controlling their thermostats, lights and appliances (from washing machines to tea kettles), Deloitte predicts that 60 per cent of all wireless IoT devices will be bought, paid for and used by industry. And over 90 per cent of the services revenue generated will by businesses and not by consumers.[13]

Modern wireless technology, whether cellular or Wi-Fi, allows a consumer with a smartphone to perform multiple useful tasks remotely, from controlling appliances to home security, climate control and lighting. But Deloitte is forecasting that total consumer demand in 2015 for this kind of solution will be 90 per cent smaller than the enterprise market. This is down to a number of issues including:

- the Internet of Things can usually only solve part of the problem, for example, you can remotely switch on a washing machine, but you still have to sort and load the laundry[14]
- savings to the consumer are often relatively small, for instance, an energy-saving smart dryer designed to take advantage of off-peak electricity would only save £30 a year[15]
- costs of implementation is often prohibitive, for example, a smart lighting starter pack including two light bulbs costs £70 with each additional light bulb costing £15, so lighting a single room could cost over £100[16]
- one of the advantages of connected smart devices is that they collect data on consumer behaviour and usage of products; however, consumer appetite for this data has yet to be proven.[17]

The connected home is coming

We have discussed the factors that will limit the potential of IoT in the consumer market in the short term; however, we believe that in the long term the connected home will become a reality. Retailers have already begun preparing for this by creating a new product category called 'home automation' that includes a range of smart products for the home such as smart lighting systems, smart thermostats, smart door-locks and the associated peripherals needed to link them. Connecting devices that were unconnected before will create opportunities to learn more about consumers, but it also requires a fundamental shift in business model. A connected product is no longer just a product, it is a service.

Auto-replenishment has obvious appeal for consumer product manufacturers as it will allow better management of inventory and lower logistical costs; however, its growth will rely upon penetration of smart appliances in the home. Most household appliances are tied into relatively long replacement cycles which will hold back growth in the number of smart fridges or smart dryers in the short term. Although, by the time that most current appliances are due to be replaced, the cost of smart devices will have fallen; whilst the number of products and services designed to take advantage of this new technology will have increased. Many existing appliances will be replaced by smart appliances and as this installed base grows, so do the opportunities for manufacturers.

The rise of the connected home will open up more opportunities for manufacturers to sell direct to consumers, either via auto-replenishment as in the coffee machine example above or subscription products and services. This will prove very disruptive in a marketplace where the retailer is currently in control of the relationship with the customer. The consumer potential for the Internet of Things is coming, it just is not here yet.

The benefits for business are already here

The direct benefit for most consumers from remote control of their washing machines is likely to be marginal; but the value to the machine manufacturers is enormous, not just for the information about reliability and advance warning of when a failure is about to occur, but for real-time information on which features are actually being used and how. The insights revealed by this stream of data could be worth hundreds of dollars per machine over its life,[19] recouping the cost of making an IoT-enabled washing machine tens of times over.

In a real-world example, a manufacturer spent millions of dollars and several months building a low-energy automation feature that required customer opt-in. IoT data from users showed that less than one per cent of customers actually used it. This prompted the company to change it to a self-learned energy management feature that deployed automatically, translating into customer cost-savings.

Despite all the media excitement around consumer uses for the Internet of Things, most items are selling in their hundreds of thousands as connected devices, sensors or controllers; very few are selling in their millions. At the same time, enterprises are buying and using tens or even hundreds of millions of IoT devices. Smart meters, smart grids, smart homes, smart cities and smart highways are just some examples. Factories, mHealth, shared transport solutions (such as car and bike rentals) or resource industries can all benefit, too.

We believe that in the long term the connected home will become a reality. Retailers have already begun preparing for this by creating a new product category called 'home automation'.

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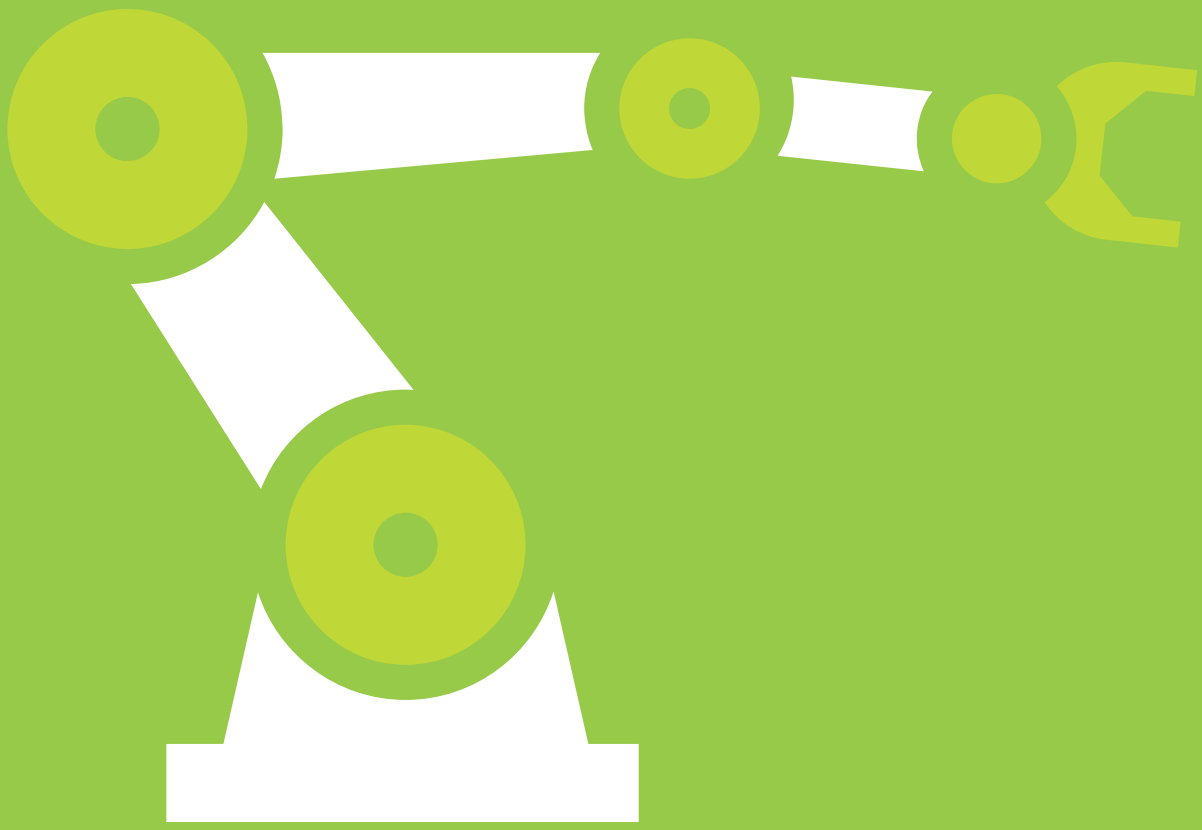
Case study – Costa Express

Costa Coffee introduced its Costa Express multiple self-serve coffee machines to respond to growing demand for on-the-go coffee consumption. The machines are located at partner locations such as retail stores, airports, hospitals and academic institutions. The original machines provided real-time reporting on sales and machine performance but lacked the functionality to enable auto-replenishment. Costa initiated a project to connect its self-serve machines to allow for demand forecasting, inventory optimisation and auto-replenishment through the use of Tools Group's SO99+ supply chain planning software. Within six months of going live across 3,500 machines in the UK, Costa had reduced stock at its partner sites by 20 per cent and delivery refusals by 50 per cent. It also reduced its annual logistics operating costs by 30 per cent as it can more accurately predict demand and automatically adjust supply to meet it.

Case study – Wink arrives at Home Depot

The Wink connected home platform was originally created by innovation company Quirky as a tool to control General Electric connected devices – who is also an investor in the business. However, it has since expanded into a central point of control for all connected devices in the home. It is compatible with a range of products from different manufacturers such as Dropcam, Honeywell, Schalge, and Kwikset. By July 2014, the Wink Hub, which costs $80, had achieved 'listings' in over 2,000 US retail locations including a major distribution deal with Home Depot, the leading home improvement retailer in the US.[18] The Wink Hub can be used to connect devices that work on different operating systems and that use different network technologies such as Wi-Fi and Bluetooth to connect. The Wink App then provides one central point of control; for example, it will allow consumers to connect their smart door lock to their smart lighting system and their smart thermostat, so that as you get out of your car and remotely unlock you front door it will also turn the lights on and the heating up.

Smarter machines to serve the connected consumer



Smarter machines to serve the connected consumer

The use of drones, robotics and artificial intelligence in the consumer market is driven primarily by a search for greater efficiency and the need to respond to market change.

The growth of e-commerce has forced retailers and their suppliers to rethink their supply chain and distribution infrastructure leading to increasing warehouse automation. More online activity is also increasing the volume of customer data and is driving more widespread use of analytics which has been facilitated by increasing processing power and more intelligent software. Similarly, consumers' demands for more flexible but low cost fulfilment options have also led some retailers and delivery companies to experiment with using drones for delivery.

Drones, a solution in search of a problem

Deloitte predicts that in 2015, the active base of non military drones costing $200 or more should exceed one million units for the first time. We expect sales of non military drones (also known as unmanned aerial vehicles or UAVs), to be about 300,000 units in 2015, with the majority being bought by consumers or 'prosumers'. We expect total industry revenues to be $200 $400 million in 2015 (equivalent to the list price of a single, mid sized passenger jet). In short, while we believe that UAVs have a tremendous range of applications, particularly for enterprise and government, we are not foreseeing a breakthrough year for drones in 2015.

Drones yet to deliver

There has been some considerable hype surrounding the potential role that drones could play in fulfilment. A number of businesses across the consumer sector such as Amazon, Google and DHL have all conducted trials of drone delivery. The last mile of delivery is where the highest proportion of cost resides for the retailer. If drones could help reduce this cost, they could potentially save retailers millions. However, at present, limitations on battery life and restrictions on use of drones for commercial activity are holding back commercial uptake. Costs are also an issue at present.

The key capital costs in provisioning a drone suitable for delivery of packages are:

- The UAV, at about $10,000 $50,000 per unit. The $10,000 price point assumes a bulk order or self assembly. Each drone can make up to 5,000 round trips of up to ten kilometres. Some drones may get stolen, lost in transit or damaged.[19]
- Rechargeable batteries, at about $200 $400 per pack. At this price, batteries would have a range of ten kilometres with a two kilogram pay load. A battery lasts about 100 charges and its range declines following each charge.
- A system control unit which would control the flotilla of UAVs provide air traffic control and log flight paths. This unit would cost from $30,000.

These costs exclude operational costs, which could be significant. An autonomous UAV that can rely entirely on satellite navigation for guidance should need no piloting; however, if the GPS fails, the drone is basically blind. In some markets this would not be legal, and a pilot would be required to guide the device while other individuals could be required to perform flight control. An individual would also be needed to swap used batteries with fresh ones.[20]

Flying inventory assistants?

Another way in which drones could be deployed in the consumer business sector is in the warehouse to help reduce the cost of checking warehouse inventory.[21] Taking inventory is a labour intensive task and involves walking around a warehouse with an RFID antenna or scanner and recording the location of every item. The antenna or scanner can be easily mounted on a drone that can then check stock levels while flying around the warehouse. Another advantage of using a drone as opposed to a person for inventory checking is that a drone could more easily reach the upper sections of stacks where a person would need a ladder. In addition, by using ultrasound sensors, 3D cameras and laser scanners to perform 'simultaneous localisation and mapping' there is no need for an external navigation system or pilot.

Case study – DHL

Nine months after announcing its "parcelcopter" research project, logistics company DHL launched its first regular drone delivery service in September 2014.[22] The service will use a drone to deliver small parcels to the German island of Juist which is inhabited by 2,000 people. Deliveries will include emergency supplies such as medicines. Flying at below 50 metres and using a fully automated route to a landing site means that the drone will avoid entering commercial air space which is more restricted. The service is scheduled for times when other delivery services may not be available or practical.

Robotics start to move from back to front office

The broader robotics market follows a similar pattern to that of the drone sector. Sales to consumers make up the majority of sales by volume, with Deloitte forecasting that six million robots for personal use will be sold in 2015.[23] About 70 per cent of these will be robots designed for domestic tasks such as mowing the lawn or hoovering the floor, 15 per cent of these will be toys, with the remainder targeting the education and health sectors. However, consumer sales make up only a small percentage of the market in value terms.

Robots have long been used in manufacturing to automate labour intensive and repetitive tasks, and to improve efficiency and accuracy on product lines. In recent years they have been increasingly used in the warehouse as businesses look to reduce order processing and increase warehouse efficiency. Deloitte estimates that the market for sales of robots for logistics, packaging and materials handling will be worth $18bn in 2015 based on industry forecasts and is set to nearly double by 2020.[24]

In addition to warehouse automation, a number of brands and retailers are beginning to experiment with the use of robots in-store. These new robots are designed to interact directly with consumers or assist them with their shopping. Recent launches range from the Budgee robotic shopping trolley that is designed to follow shoppers around a store, to the Orchard Supply Hardware OSHBot that can lead a customer to the product they are looking for, to the Pepper humanoid robots that Nestlé is trialling across its store portfolio in Japan that can converse with customers (see case studies on p.12). Robots are already transforming the back office and are beginning to move into the front office.

The business case for the use of robotics technology in retail is well established when it comes to warehouse automation. It is less clear for customer service robots, due to the cost of designing, developing and building robots compared to the cost of employing traditional customer service assistants. However, as costs fall and consumer acceptance increases this may change, but for the moment the use of robotics in the consumer business sector will remain focused on increasing efficiency in warehousing and logistics where the economics are clearer.[25]

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Case Study – Nestlé Pepper Robots

Nestlé has announced plans to buy up to 1,000 Pepper humanoid robots from manufacturer SoftBank to use as customer service 'staff' in its stores across Japan. The Pepper robots will converse with customers and provide information on products and services thanks to an intuitive artificial intelligence interface that reads and interprets voice, touch and emotions. The robots cost $1,700 and can understand 80 per cent of conversations, with plans for a roll-out across Nescafé stores by the end of 2015.

Case Study – OSHbots

US hardware retailer Orchard Supply Hardware, a subsidiary of US DIY retailer Lowe's, has unveiled a new customer service robot in a number of its stores. Named the OSHbot, the robots have been developed by Lowe's Innovation Labs division in collaboration with Fellow Robots. The OSHBot can speak two languages (English and Spanish), recognise any part or item of stock immediately and help a customer find it. It holds real-time stock information ensuring that as soon as a customer enters the store they can find out if what they are looking at is in stock. The robots cost $150,000 – although the cost of parts is falling – and are designed to assist rather than replace existing store staff.

Case Study – Amazon's Kiva Robots

In 2012, Amazon.com acquired Kiva Systems for $775 million, as it looked to consolidate control ahead of a roll out of Kiva warehouse robots acrossits distribution network. Following testing during 2013, the company announced a significant roll out in time for the 2014 peak trading period. Today Amazon has over 15,000 orange Kiva robots working across ten sites. The business case was built around the fact that a warehouse worker typically spends 65-75 per cent of their day walking. The Kiva robots follow grid patterns on the warehouse floor and bring shelves to the pickers.

Mobile: Payments and proximity

Mobile: Payments and proximity

Mobile has proved to be the most disruptive digital technology in the consumer market. Not only does device ownership continue to rise but the devices that we have are becoming more powerful. This opens up more opportunities for products and services targeted at the connected consumer.

Here we highlight two areas that will accelerate change in the consumer market in 2015 and beyond: mobile payments and the use of beacons to both enhance the offline experience and allow business to conduct one-to-one proximity marketing campaigns.

Contactless payments gain momentum

Deloitte predicts that by end-2015, five per cent of the base of 600-650 million near-field communication (NFC)[26] equipped phones will be used at least once a month to make contactless in-store payments at retail outlets.[27] This compares with monthly usage by less than 0.5 per cent of the 450-500 million NFC-phone owners as of mid-2014.[28] Contactless mobile payment will not be mainstream by end-2015, but niche adoption will be a major progression from near nil in prior years.

Looking further ahead, Deloitte expects that the number of NFC-enabled devices being used for making in-store payments should rise steadily over the medium term, as consumers become more familiar with the process, and more banks and merchants in more markets accept this form of transaction.[29] We expect the volume of NFC-smartphone transactions and the range of spend value to increase steadily over time.

Beacons create opportunities for proximity marketing

Bluetooth Beacons are Bluetooth Low Energy (BLE) devices that are used to indicate the proximity of another device such as a smartphone or tablet. The devices are increasingly being used to communicate with consumers and enable a range of proximity-based services from personalised coupons and vouchers to additional product information and payment. Research on the US market has forecast that 30 per cent of all retail stores will have beacons installed by the end of 2015. Deloitte predicts that uptake in the UK will be slower, with store penetration of between 15 and 20 per cent by the end of 2015.

The majority of outlets with beacons installed will be those operated by the largest retailers who are already trialling the technology. While their adoption will be relatively widespread, their impact as measured by sales will be relatively small in the short term with beacons predicted to influence less than 0.5 per cent of retail sales in 2015. However, their impact on loyalty and conversion could be much higher with many seeing an increase in consumer interactions with advertised products of up to 20 per cent, with app usage increasing by up to 16 times the normal level of engagement.[30]

Beacons are predicted to drive growth in the use of proximity marketing campaigns where messages and promotions are tailored to both an individual and a specific location. Using an opt-in process, consumers can choose to receive tailored messages, promotions and additional content. One example was the Ladies' Night campaign run by the Meadowhall shopping centre in Sheffield in July 2014 where beacons were used throughout the shopping centre to create a 'treasure hunt' of offers and promotions across a range of participating stores.[31] Another example is the Crown Estates' Regent Street App which is one of the UK's first multi-retailer promotions to use beacon technology to build up a picture of individual consumers as they shop across a range of different stores.[32] The main benefit for consumers is that the app allows them to optimise their shopping trip by being able to see offers and promotions across a number of brands.

One of the limitations of beacon usage is that consumers must have an app open in order to receive notifications. However, consumers with iPhones that use versions of the iOS 7 or iOS 8 operating systems do not have to have the app open for the beacon to connect. This means that the next time the consumer opens the app he/she may receive a targeted message even though they didn't open the app. This is the way that consumer goods giant Unilever is using beacon technology to help with the targeting of its promotions for its soup brand, Knorr, in Sweden (see case study on p.16). Recent research from Edigital suggests that 45 per cent of UK smartphone users would be willing for retailers to send messages to their smartphones and 33 per cent thought that personalised messages sent to their phones would be more likely or very likely to influence their purchase decisions. However, there are still many consumers that remain unconvinced and who would be unwilling to receive unsolicited messages.

While they have an obvious application in retail, beacons are also being used across the consumer market from theme parks and restaurants to airports and sports venues. Airport operators are investing heavily in technology such as beacons to help travellers avoid missing boarding announcements, notify them of departure gate changes and even help them avoid queues at check-in.[33] However, beacons are not the only technology open to consumer businesses looking to target their customers' location specific communications. Conventional Wi-Fi is also emerging as a competitor to beacons, as once a consumer has logged on to a Wi-Fi network for the first time and the operator has their MAC (Media Access Control) address they are then able to track that device around the location.

Improving the customer experience

Beacons can also be used to improve the customer experience across the shopping journey. For example, when a consumer arrives at the front of a store to collect a purchase that they have made online, a beacon could notify the click and collect team to ensure that the customer's product is ready when they arrive at the customer service counter.

Case study – Phone manufacturers move into payments

In October 2014, Apple released its Apple Pay mobile payments solution. The platform combines NFC technology and biometric identification via Apple's Touch ID sensor to make a fast and secure payment without the need for a bank card. The fingerprint data is stored on the device as is a digital account number unique to the device. No bank account details are stored either on the phone or in the cloud. Apple Pay also uses a tokenised system whereby a unique code is passed between customer and retailer rather than the card details. If someone were able to hack the transaction, all they would get is the unique code which is useless outside the context of that individual transaction. This system also has benefits for the retailer as they do not have to hold the customer's card data reducing data protection costs. Apple Pay is set to launch in the UK in 2015.

Rival handset manufacturer, Samsung, has also made a significant move into mobile payments through its acquisition of LoopPay. LoopPay offers a different model for mobile payments which utilises existing payment technology. The LoopPay system requires the purchase of a device that can be attached to a smartphone. The attached device will then allow the smartphone to work with a traditional bank card reader. Samsung plans to launch a new payment service in 2015 called Samsung Pay that will combine the LoopPay system with NFC technology.

Deloitte predicts that by end-2015, five per cent of the base of 600-650 million near-field communication (NFC) equipped phones will be used at least once a month to make contactless in-store payments at retail outlets.

Case study – Unilever and *Aftonbladet* use beacons to collect shopper data

Unilever start-up incubator, The Foundry, launched in 2014 a beacons pilot for the Knorr brand in Sweden. The Foundry provides a central hub for Unilever's technology development projects. Unilever has equipped a branded food truck in Stockholm with a number of beacons. It offers passing customers free soup either to consume on-the-go or to take home. The beacons located in the food truck work in conjunction with the Swedish newspaper *Aftonbladet's* app installed on the consumer's mobile device. The next time he/she opens the app, the display advertisements that they would usually see will be replaced by Knorr soup coupons. By partnering with a media owner like *Aftonbladet*, Unilever gains access to customer data at a lower cost. The use of more personalised promotions and coupons allows Unilever to learn more about customer preferences and how they shop and respond to promotions.[34]

Case study – Brussels airport uses Wi-Fi to help cut queues

Brussels Airport has installed a new series of sensors in a new Connector facility which will link the passenger terminal to Pier A and help the airport operator control the flow of passengers through the terminal. The trial that will open in the first quarter of 2015 will also help airport managers to ensure that the right level of resource is available at the right time by tracking passengers through the airport identifying queues and potential bottlenecks. The sensors supplied by BLIP Systems track passengers via their phones, tablets and other connected devices as they try and connect to Wi-Fi networks or Bluetooth connections. The data gathered allows the airport to display accurate waiting times at different points throughout the airport and display this information in real-time.

3D printing goes mainstream for business

3D printing goes mainstream for business

As a technology, 3D printing is more than 25 years old, although recently it has received an increasing amount of attention from consumers and 'prosumers' – enthusiastic hobbyists who have embraced the idea of printing 3D objects at home. However, the real potential for 3D printing is not in turning every home into a factory producing its own customised products, but in driving efficiency for businesses across the supply chain.

A factory in every home?

Deloitte predicts, in line with the industry consensus, that in 2015 nearly 220,000 3D printers will be sold worldwide, with a value of $1.6 billion, representing 100 per cent unit growth and no more than 80 per cent value growth[35] versus 2014. But there will not be a 'factory in every home': although 3D printing can be seen as 'the next Industrial Revolution' the real revolution is for the enterprise market, not the consumer.

By 2017, about 70 per cent of units will be sold to consumers, but almost all of these will be small units with relatively limited capabilities for producing functional parts. Value and usage will be heavily skewed to the enterprise market. Deloitte estimates that enterprise (rather than consumers) will account for just under 90 per cent of the value of all 3D printers, over 95 per cent of all printed objects by volume and 99 per cent by economic value.

Deloitte also predicts that rapid prototyping and the production of 3D-printed objects that fit into existing manufacturing processes (such as creating a mould, die, cast or tooling that will be used to make final parts) will represent 90 per cent of the 3D objects made by enterprises. Although likely to be the fastest-growing component of 3D printing, final-part manufacturing will still represent less than ten per cent of 3D objects printed.

The relative insignificance of the consumer 3D printing market is due to several factors. One is the unit price. Home devices for under $1,000 have now been available for eight years and can print fairly small grapefruit-sized objects out of limited-performance materials and with relatively coarse features. High-end industrial machines are capable of producing finer details, are faster and can print larger objects, but the largest units can cost almost a million dollars, and even smaller machines cost on average hundreds of thousands of dollars each.

But that is only part of the problem holding back the consumer market. In the near term, the less-expensive home devices have some crucial limitations. They can be extremely difficult to calibrate, maintain and use. If the heated bed on which the plastic material is being extruded is even one or two degrees too cold, the object will not form properly, while a degree too hot can cause it to stick to the plate. This deters many consumers from buying a device, and those that do often abandon their machine after producing only a few objects. And this will not be changing soon: according to one forecast, only ten per cent of home machines under $1,000 will be 'plug-and-print' by 2016.

Another factor that has limited consumer uptake of 3D printers has been a lack of familiarity with CAD (computer assisted design) software. However, this is changing rapidly due to the development of a number of new software packages and apps.

In contrast, a cross-industry survey found that in 2013, one in six enterprises in developed countries owned or were planning to acquire a 3D printer. Deloitte's view is that by the end of 2015 the ratio will be one in four, although it will vary considerably by industry.

3D printing will democratise innovation

3D printing can speed up the design process and help reduce the time it takes to develop new products by allowing rapid prototyping. For some companies this will allow access to prototyping that would not have been available to them due to the cost. This is in effect democratising innovation by making it faster, easier and cheaper to design, build and test new products.[36]

Changing the fundamentals of manufacturing

Beyond rapid prototyping there is also the potential for 3D printing to transform manufacturing. Traditional manufacturing uses the subtractive method, which includes cutting, gluing, forging and assembly of different parts to create a product. 3D printing can produce the same product in a single operation, printing layer by layer. By printing lattices a 3D printer can also create smaller, lighter and stronger products than traditional manufacturing techniques. At the other end of the scale, macro 3D printing is now possible on printers that can print objects up to six metres in each dimension in a range of different materials including one that uses sand plus a binding agent to create something close to sandstone. Recent advances in 3D printing technology mean that it is now possible to print circuitry.[37]

Increasing supply chain flexibility

3D printing also offers the opportunity for manufacturers to radically rethink their supply chains and postpone production until the latest point possible in order to allow individual customisation. Beyond the ability to provide more customised products, postponing production can help reduce inventory levels and ultimately plant capacity. However, the extent to which this is practical will vary from industry to industry.

While 3D printing can transform existing operations it has also helped create new business models, particularly in the retail sector. Concepts such as the MakerBot store or Amazon online 3D printing store that offer consumers the chance to select, customise or even design their own products, would not have been economically possible without 3D printing.[38] However, for the moment these initiatives seem to focus more on creating interest in 3D printing technology and therefore fall into the marketing category rather than a serious commercial retail venture.

In China, one construction company has used 3D printers to print houses,[39] while in the US we have seen the launch of 3D printed cars.[40]

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Case study – Target and Shapeways

In an example of how retailers are experimenting with 3D printing to offer consumers more personalised products, US retailer Target launched a "be the designer" campaign in conjunction with 3D printing company Shapeways in November 2014. Online shoppers visiting the Target.com website were able to select 3D printed gifts such as jewellery and then personalise them by choosing their colour, size and the materials they were made from. Prices started at $7.99 for plastic charms.[41]

Case study – Coca Cola and Ekocycle

In 2014, Coca Cola partnered with 3DSystems to create the EKOCYCLE Cube 3D Printer that reduces waste by using recycled plastic filament to create 3D products. The EKOCYCLE Cube uses PET plastic filament, in part, produced from discarded plastic bottles. The filament is supplied as cartridges which contain approximately 20 recycled plastic Coca Cola bottles.[42]

Click and collect: Fragmented fulfilment

Click and collect: Fragmented fulfilment

In the UK, home-delivery volumes are expected to flatten out in 2015, suggesting that growth in e-commerce has to come from alternative delivery options.[43] Click and collect, where products can be delivered to another physical location, offers the best of both worlds: a wealth of choice in selection and flexibility in collection.[44]

The rise and rise of click and collect

Deloitte predicts that the number of click and collect locations in Europe will reach half a million in 2015, a 20 per cent increase on the previous year. Click and collect, where online orders are picked up from a physical location rather than delivered to the purchaser's home, is likely to become an increasingly fundamental part of the e-commerce offer and should help maintain its growing share of retail spend.

Redefining convenience

The key friction point in e-commerce has been delivery. Every year, online orders trigger billions of individual deliveries in Europe alone. Delivery timings on most products bought online are approximate to keep costs affordable, and recipients are not always home to receive the goods. The consequence is that recipients may have to travel to a central depot and wait in line to pick up parcels, cancelling out a key element of the convenience of shopping online. The direct cost to retailers of failed first-time delivery is over a billion dollars per year in the UK alone.[46] The indirect cost may be consumers taking their business to other retailers with more flexible delivery options. During peak shopping periods, there simply might not be enough delivery capacity to cope with the volume of e-commerce orders, and so click and collect can provide extra capacity.[47] This was the case in the run-up to Christmas 2014, when a number of high profile retailers experienced difficulty with managing peak demand.

The fragmentation of click and collect

There are three main types of location that consumers can collect their purchases from: in-store (including, for larger venues, the car park), a third-party location (such as a post office or a train station) or a locker (often located on a commuter route). In 2015 we expect that of the 500,000 pick-up locations, about two-thirds will be individual lockers, some of which will be in clusters of hundreds, just over a quarter will be third-party locations and the remainder (about 37,000) will be stores.

Third-party locations will be a blend of mixed-use sites, such as post offices offering an additional collection service, and dedicated sites, including changing rooms.[48]

In Europe, the UK is currently the most mature e-commerce market, with 13 per cent of all retail revenues from online in 2015, of which about a third will be click and collect. Revenues from click and collect more than doubled in the UK between 2012 and 2014, reaching $8.7 billion from 140 million orders.[49] By the fourth quarter 2014, about 95 per cent of those online stated that they planned to use click and collect for some of their holiday shopping.

We expect the e-commerce share of retail to grow in most other European markets, and click and collect to become an increasingly common offer.

Click and collect's impact is likely to vary by retail segment, with non-grocery representing the majority of sales. In the UK in 2013, non-grocery was estimated at 95 per cent of sales.[50] For some major non-grocery retail chains, click and collect already represents close to half of online orders.[51]

Opening the door for disintermediation?

For retailers, the ideal outcome from offering click and collect would be to increase the propensity to purchase from the website and, additionally, in-store when the customer is picking up his or her package. Click and collect may be driving aggregate online spend by offering greater convenience. In the UK, click and collect's share of all e-commerce has risen steadily over the past three years, along with a rise in e-commerce's share of all retail spend.

Click and collect won't be limited to bricks and mortar stores. Online retailers also offer the service, sometimes using third-party outlets and lockers to deliver goods and sometimes using retail stores.

For example, goods purchased on eBay can be picked up at 650 stores of UK retailer Argos.[52] Ocado, the online specialist in the sector, has also introduced a click and collect service to respond to growth in consumer demand.

As more online retailers move into click and collect fuelled by the growth of third-party providers such as Doddle, Collect+ and ByBox, we expect to see some branded goods manufacturers start to experiment with using click and collect to sell directly to consumers. To date, one of the main barriers to this has been the cost of the final mile delivery and the need to deal with individual orders from consumers in businesses that have been used to delivering bulk orders to warehouses and distribution centres. However, the growth in the popularity of click and collect with consumers and the growth in the availability of third-party providers will make this option more attractive to manufacturers.

The real cost of click and collect

At first glance, click and collect may seem a win-win for retailers and customers alike. Consumers are offered additional convenience, hopefully encouraging them to spend more while retailers avoid the cost of delivery to the home, and can utilise existing space.

But every element of delivery incurs a cost: every square metre of space used for storage displaces space that could be used for display, and any staff member processing a collection is unable to assist other customers.

Making purchasing more convenient for customers may also make it easier to return goods – unwanted items, when seen 'in the flesh', can easily be returned at the point of sale. This could stimulate 'buy-to-try' sales, leading to over-stocking of baskets, causing a surge in the volume of returns. Retailers need to monitor carefully the costs of offering click and collect, and in some cases may need to remove the offer.

Retailers may also need to vary the click and collect offer on a periodic basis. Free collection the day after ordering may be restricted to quiet shopping periods, but during sales, and at events like Christmas or Black Friday, the collection period may need to be extended.[53, 54]

Retailers can also shape collection behaviours, for example by using automated systems to advise customers via email or apps when goods have arrived or by using vouchers to encourage prompt collection during off-peak times.

NFC-enabled phones, linked to consumers' credit card details, may be used in the collection or return process. By generating a unique transaction code, NFC-enabled phones can be used as a proof of identity.

The availability of click and collect is likely to encourage some customers to over-order in the knowledge that unwanted goods can be immediately returned and refunded. This will be particularly the case with clothing. Customers may order a wide range of goods, in a manner similar to how they pick an assortment of clothing off rails to try on in the changing rooms. They may then keep one of the half-dozen items they have tried on. With in-store sales, unwanted items would not be rung up in the till; with click and collect all items selected would be 'sold', and then all unwanted items would be refunded. This may cause sales data to be distorted by the volumes of try-to-buy purchases. Retailers offering a much wider range of goods online may also face rapidly increasing costs in delivering orders to stores and in expanding their capacity to handle returns.

The direct cost to retailers of failed first-time delivery is over a billion dollars per year in the UK alone.[46]

Case study – Doddle

Doddle is a joint venture between Travelex founder Lloyd Dorfman and Network Rail launched in June 2014. The concept is to help service growing consumer demand for click and collect services by opening up to 300 stores at railway stations across the UK. The Doddle network will be available for all offline and online retailers as well as the delivery companies for both deliveries and returns. Consumers can arrange to have orders from the likes of Asos, New Look and TM Lewin delivered to Doddle outlets for collection. They will also be able to return unwanted goods. Some of the Doddle outlets in high footfall areas such as London Waterloo will have changing rooms for customers to try on purchases and return immediately if necessary. The Doddle model is simple: consumers pay either a one-off fee of £1.95 per collection or can pay a monthly subscription for unlimited collections. Returns are free and deliveries start from £2.60. In February 2015, Doddle announced that it will offer international deliveries from its current network of 30 outlets.

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