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Online campaign: Jeremy Corbyn may have been ridiculed by the press and denounced by mainstream Labour rivals, but many of his 250,000 supporters were operating in a different sphere — Mary Turner/Getty

From 'Yes we can' to #JezWeCan victory

Across the globe, party activists are using social media to disrupt traditional politics, write *George Parker* and *Katie Samuels*

Is Jeremy Corbyn Britain's first digital party leader? The bearded 66-year-old Labour leader is more likely to be spotted on his allotment picking soft fruit than drinking organic smoothies in a shared work space in Shoreditch, but he is very much a product of the social media age.

Just as digital technology has disrupted business, Mr Corbyn and his far-left supporters have deployed social media to disrupt traditional politics: his campaign took on the Labour party establishment and a hostile mainstream media and blew them both away.

During a remarkable summer, the ban-the-bomb peace campaigner and veteran socialist blindsided his opponents and transformed himself from 200-1 outsider to runaway victor in the Labour leadership contest, propelled by a remarkable digital campaign.

Mr Corbyn may have been ridiculed by the press and denounced by mainstream Labour rivals, but many of his 250,000 supporters were operating in a different sphere, talking to each other and organising #JezWeCan on social media, mimicking the "yes we can" election slogan of Barack Obama's 2008 presidential campaign.

According to YouGov, almost 60 per cent of Corbyn supporters used social media as their "main source of news", compared with about 40 per cent for supporters of his main rivals and 32 per cent of the general public.

While the politician was riding an anti-politics, anti-austerity tide, it was digital campaigning that galvanised his army of Corbynistas, packing out rallies around the country and making his rivals look tired, flat-footed and overtaken by events.

Social media works well for insurgents. While Mr Corbyn was heading for an unlikely triumph in London, Bernie Sanders, another veteran socialist, was making the running in the battle for the Democratic nomination for US president. The 74-year-old Vermont senator has spent most of his political career being ignored by what he calls the "corporate media", which he claims has little interest in leftwing causes such as climate change or the dominance of global corporations.

"Social media has revolutionised a whole [lot] of things and in many ways it works for us," he said. "The message I have been advocating for many, many years is quite difficult to get through the corporate media. Those are not issues that they are particularly interested in discussing."

His rivals for the White House are inevitably also deploying elaborate social media strategies. Hillary Clinton has more than 4.76m followers on Twitter, while Facebook reported that 3.4m people shared information about Donald Trump 6.4m times in the 24 hours after he joined the presidential race.

In the UK, Craig Elder, who ran the Conservative party's digital team in David Cameron's successful 2015 general election campaign, says politicians in Britain have been slow to understand how the digital revolution has transformed their world.

He says that during the 2010 campaign, which he calls Britain's "first digital election", none of the parties had a

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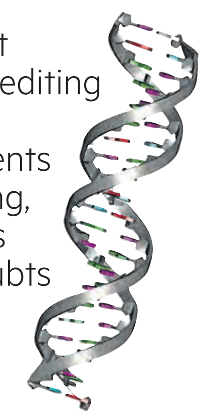


Sellers focus on devices and services to deliver more

Shopping

Andrea Felsted considers some of the latest trends and developments taking place in the world of retail

Shopping was one of the earliest corporate activities to be shaken up by the digital revolution. There is no sign that the pace of digital transformation is slackening, so here is a look at some of latest developments in online retail.

1. Amazon Fresh. After selective US expansion, the grocery service is moving into Europe. Amazon offers a selection of about 50 chilled and frozen lines, alongside staple groceries it has sold for some time, such as beans and coffee. The service is being tested in Birmingham and London through Amazon Prime Now, which offers buyers one or two-hour delivery slots. The company has followed this with Amazon Pantry, which delivers food and grocery products to Prime customers, who pay an annual subscription of £79. Amazon said the service would initially cover 4,000 everyday non-perishable essential items, with customers paying from £2.99 for next-day delivery of a 20kg box of groceries.

Jim Prevor, of the Perishable Pundit blog, says Amazon Fresh is a "serious threat to all bricks and mortar retailers".

2. Amazon Dash. This enables customers to repeat everyday household goods orders without even visiting its website. WiFi-enabled gadgets allow customers to reorder from Amazon Fresh by scanning a barcode or speaking into the device.

3. Instacart. Even Amazon itself is facing disruption. Its nascent US online grocery market is being challenged by outfits such as Instacart.

Instacart takes consumers' online grocery orders and uses personal shoppers to pick up the goods in Walmart or Target stores before delivering them to customers' doors.

J Sainsbury, a UK supermarket, is pioneering the SmartShop app, which lets customers scan goods in stores and pay for them via their phones.

4. Jet. Created by Marc Lore, founder of Diapers.com, Jet is a US shopping club that launched in July. Its aim is to reduce logistics and shipping costs by matching buyers with sellers near them, allowing customers to benefit from lower prices than are available on other websites.

5. Instagram. Millennials document every aspect of their life on social media and this is changing the way we shop. In the vanguard is Instagram, which lends itself to fashion and luxury goods sales. The platform does not yet store payment details that would let shoppers buy from an image posted on it, but others are developing systems to make this possible.

6. Social networks. Facebook, Twitter and Pinterest are making strides in electronic commerce in order to boost revenues. As well as "buy" buttons, Facebook is building mini ecommerce sites on companies' pages, to enable quick purchasing from adverts. Twitter allowed its users to purchase from tweets last year, while Pinterest, a scrapbooking site, has introduced "buyable pins" that let shoppers make purchases.

7. Messaging apps. Experts say the world of social shopping is fragmenting into open networks (share with all), such as Instagram and Facebook, and closed networks (share with a few), such as WhatsApp and Snapchat. WhatsApp, for example, might be used to share details before buying, Instagram after. Burberry embraced Snapchat, becoming the first brand to shoot and publish its advertising campaign on the site as it happened. The challenge is in measuring how effective campaigns and interactions are.

8. John Lewis. The 150-year-old UK chain this year became the first British retailer to charge customers for in-store collection of goods ordered online.

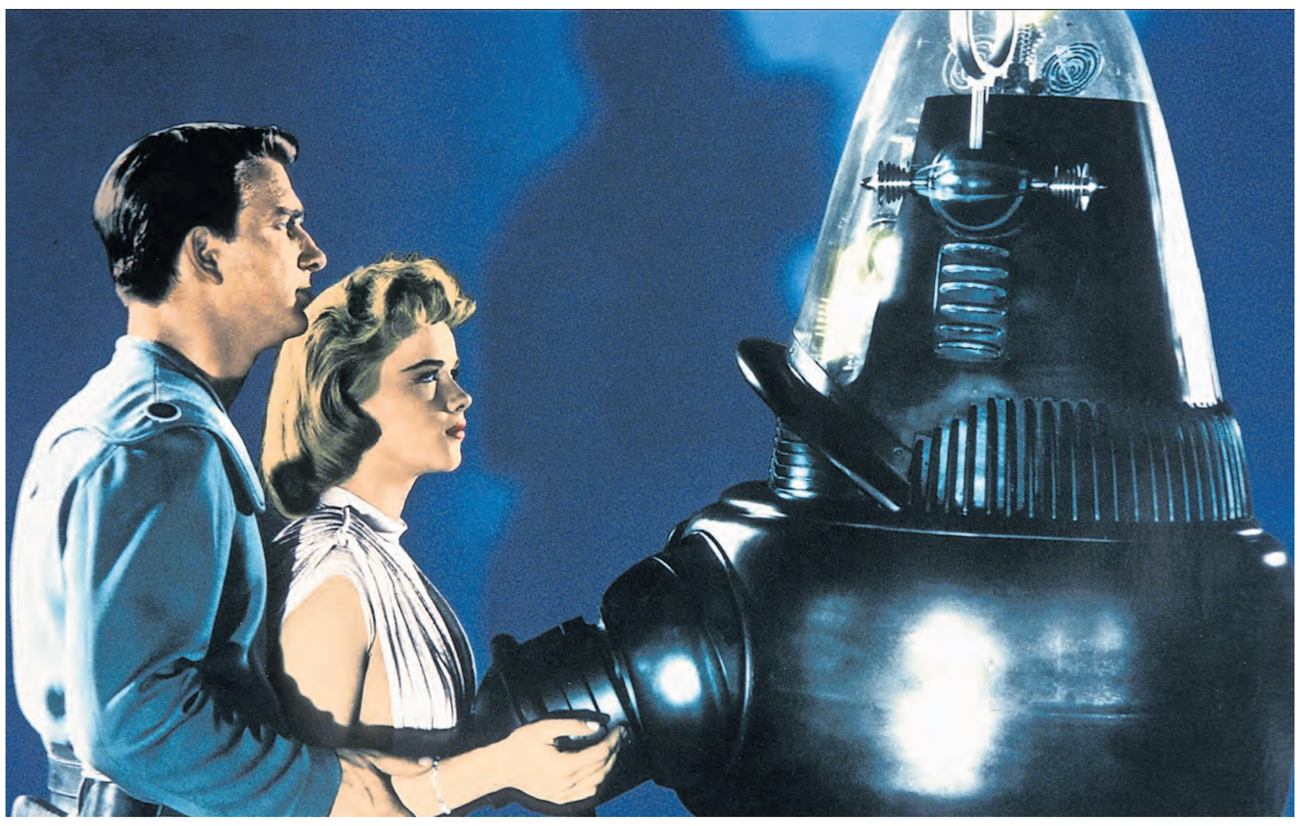
Andy Street, managing director, said free click-and-collect delivery on orders under £30 was "unsustainable". It charges £2 for these, though no fee is charged on orders above £30. No big retailers have followed.

9. Feelunique. Online beauty sites such as Feelunique and LookFantastic could potentially disrupt department stores. Cosmetics drive huge footfall into stores, but once a woman has found the right shade and texture of foundation, she can simply reorder from an online beauty site, often at a discount. This is being speeded by the big brands, such as Chanel and Estée Lauder, agreeing to have their products sold through online channels.

10. Rent the Runway. Fashion rental sites such as Rent the Runway in the US and Girl Meets Dress in the UK are catering to consumer demand for new things to wear more often. Girl Meets Dress, founded in 2009 to serve austerity-hit shoppers, charges as little as 5 per cent of the retail price for a seven-night rental. Anna Bance, co-founder, says its growth is now being fuelled by social media, which is adding to the pressure on women not to wear the same dress twice.

Traditional banks need to adapt to new breed of rival

Financial services Incumbents face unprecedented series of threats, writes *Josephine Cumbo*



The future is now: robo advisers provide pension advice for fraction of the cost of using a human being
Allstar/Cinetext/MGM

For centuries, banks have been a powerful force in driving innovation in financial services. From the development of the first branch network in Europe in the 1800s, through to debit cards, the internet and mobile banking, financial service providers have embraced technology.

But traditional banks and others, including wealth managers, are facing an unprecedented series of threats from new entrants seeking to disrupt their business models. From computers delivering financial advice to new lending networks, digital financial market disrupters are flourishing.

"New, agile and hitherto largely unregulated players are emerging and are disintermediating the traditional incumbents," said Deloitte, a professional services firm, in a recent paper.

The authors added: "Regulation is making it harder to innovate and grow, whilst legacy strategy, infrastructure and thinking are preventing the existing players from responding aggressively to this threat."

One important theme to emerge from this digital disruption is that of so-called "service democratisation", which has helped break down the barriers to entry for would-be service providers. PayPal and TransferWise have already made waves in the payments world and others are targeting important parts of the banks' business. Peer-to-peer lenders, such as Zopa and FundingCircle, are removing the banks from the equation by giving borrowers direct access to the markets via crowdfunding.

As traditional lenders are cut out of the process, borrowers can often get slightly lower rates while savers can get far improved headline rates. But customers must bear risk if there is no savings' guarantee, as there is with the traditional financial institution.

"Social trading" is also providing a challenge to the existing money management industry by enabling amateurs to deal in markets that are more typically inhabited by professional traders.

Online "social investment networks", such as eToro, allow inexperienced or novice traders access to global markets and currencies, but they also allow users to interact with each other, providing virtual hand-holding. Users can copy the investment choices of "popular investors" cutting out the need to hire a professional adviser.

"Essentially what eToro is seeking to do is democratise access to the markets and challenge the traditional business model of the money management industry," says the company, which also says it has 5m users.

The traditional wealth management industry is also feeling the chill wind of disruption. In the UK, millions of consumers are unwilling or unable to access professional advice, largely because of costs that can run into hundreds of pounds.

But robo advisers, which provide services for a fraction of the cost of a traditional face-to-face adviser, could fundamentally change the UK market if their success abroad is any indication.

Simon Bussy, principal consultant with Altus Consulting, a UK-based firm, says: "These robo-advice businesses, which use sophisticated algorithms rather than highly paid humans to manage their customers' investments across geographies and asset classes, are attracting significant venture capital in the US in the belief they are the answer to investors' prayers."

Insurance is another area that some believe will be the next to be targeted by the disrupters, largely because of its relative proximity to the banking world.

"We are starting to see technology give customers unparalleled levels of insight into their risk coverage at very granular level," says Amy Nauiokas, president of Anthemis Group, a venture capital firm.

"For example, companies like Trov [a US firm] are allowing customers to cover key items in their home, rather than selling them a generic home contents policy."

> Regulators need to consider how these non-banks can meet regulatory demands

Companies such as Anthemis are helping to finance the disrupters and market observers say that traditional financial institutions need to adapt to a new breed of hyper-competitive rival that is attracting young "digital natives" who rely on mobile devices and live in a 24-hour world where services can be accessed at their convenience.

The British Bankers' Association, a UK trade body, says digitisation is "potentially one of the biggest single changes" to the sector in recent times.

However, the BBA warns there are risks. "For the government and regulators it is vital that they maintain a level playing field between banks and non-banks as digital leads to dramatic changes across the industry.

"Regulators need to consider how these non-banks can meet the same regulatory requirements to ensure that consumers are protected."

From 'Yes we can' to #JezWeCan victory

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clue how to use digital effectively. In this year's election the Tories reached more than 17m people a week with targeted online communications during the campaign.

"We have seen digital act in a transformative way in a range of different industries," he says. "In some respects politics had some catching up to do."

Mr Elder says the Tories adopted a highly targeted campaign in 2015, running on platforms such as Facebook and YouTube with bespoke content aimed at different types of voters in different parts of the country.

It turned out to be successful, but even he admits that digital has not replaced the need for a well-staffed "ground operation" with party workers and candidates knocking on doors: "You can never replace direct communication with people, discussing the things that matter most to them."

David Cameron, who said at a Christmas party two years ago that he had never heard of the social news and entertainment site BuzzFeed, has a high degree of scepticism about how the "Westminster village" has become enthralled by the instant political debate that social media allows.

Journalists covering the UK election were as likely to spend time monitoring Twitter feeds as speaking to real voters and became convinced, aided by faulty opinion polls, that Ed Miliband, the Labour leader, was in the running to become prime minister. Mr Miliband's attempt failed spectacularly.

Mr Cameron told the Conservative party conference in October that there was a salutary lesson in this: "Britain and Twitter are not the same thing."

Michael Dugher, a Labour MP and former adviser to prime minister Gordon Brown, agrees: "The trouble is that everyone in politics is obsessed by Twitter. The lesson is that politicians are on Twitter and voters are on Facebook."

Mr Dugher says social media can skew the political debate by giving a disproportionately powerful voice to those who frequent political cyber space, while it can also have a dark side. "At its most unpleasant end, people can try to stifle debate, trolling people — especially women MPs," he says.

Michael Dugher MP: 'The lesson is that politicians are on Twitter and voters are on Facebook'

Jess Phillips, a Labour MP, was inundated with threats to murder or rape her days after she objected in October to Tory MP Philip Davies' calls for an International Men's Day debate in the Commons, "in the spirit of gender equality".

Meanwhile, online Scottish National party supporters, so-called "cybernats", were accused of intimidating opponents during the 2014 independence referendum with online trolling and abuse. The SNP denied any involvement and said there was abuse on both sides.

Few contest the idea that digital technology has disrupted politics, but ultimately politicians have to ply their trade in the real world. As Mr Corbyn is rapidly finding out, while he struggles to adapt to his job as Labour leader, that can be a much more challenging place.

A blind eye to online critics can be bad for business

Holidays and hotels

Many executives feel unable to defend their reputation, reports *Jessica Twentyman*

Whether businesspeople love or hate online customer reviews, it seems they are here to stay — but they can do as much harm as good to your business.

The UK's Competition and Markets Authority last February invited businesses of all kinds to submit their experiences of online reviews.

In response, the British Hospitality Association surveyed 758 of its members, covering a range of hotels, restaurants, cafés and attractions. In general they recognised the value they get from the online client reviews and three-quarters of them said they found the comments to be "very useful" or "quite useful" for marketing and promoting themselves to prospective customers.

But a good many also expressed the view that online reviews can quickly become a weapon against them.

More than half of the BHA respondents believed that a single review has damaged their business, with many saying they had reason to believe that a negative review was motivated not by a genuine experience of bad service, but by malicious intent.

Motives given ranged from opportunists looking to secure a freebie, unscrupulous competitors seeking to undermine a rival, or disgruntled staff wanting to settle a score.

"What's even more troubling is that many businesses feel they're not able to defend or restore their good name in the wake of an unfair review," says Martin Couchman, the BHA's deputy chief executive.

Most businesses that had sought help from online platforms to redress the balance said they found third-party review sites "not helpful". The sites deny such charges and say they have robust anti-fraud measures in place. They add they have a duty to customers who want their point of view to be aired.

TripAdvisor, a review website, says: "Our terms of use clearly state that anyone submitting content to our site agrees not to post libellous or defamatory material."

Matthew Walls, vice-president of marketing for Europe, Middle East and Africa at Hotels.com, has no concerns over the authenticity of the 15m reviews hosted on its site as they can only be posted by customers who have booked a stay via the site and had a personal email inviting their comments. That, he says, rules out interference from mischievous third parties.

But what he has observed is that, even when reviews can be judged to be genuine and hoteliers are given an opportunity to respond directly, many do not.

A study by management consultancy firm PwC bears this out. Researchers looked at reviews posted online about hotels in western and central Europe between March 2014 and February 2015. They found that only 13 per cent of these received a response from hotels.

A frequent theme of the few hotelier responses that do get posted, Mr Walls says, is: "I wish you'd let us know at the time."

Hotels.com is developing a quick-survey service that allows clients to submit feedback on a hotel within hours of checking in. Their first impressions, their views on the check-in process and the state of their room can then be shared with the hotel while there is still time to rectify any perceived problems.

Harsh criticism: TripAdvisor says it has strong guidelines for users

Initial feedback from guests and hoteliers involved in testing the service has been positive, Mr Walls says, and Hotels.com hopes to launch it by the end of 2015.

Even when posted long after a stay is over, hotel responses are still an important opportunity for brand-damage control, advises Patrick Phelan, vice-president of client services Europe, Middle East and Africa for Bazaarvoice, which collects, manages and moderates reviews for Hotels.com, Thomas Cook and InterContinental Hotels Group.

Mr Phelan says: "When it comes to negative reviews, companies in the travel industry often feel they're under siege. They don't know how to respond. They don't always see there's an opportunity for a conversation, one that starts with acknowledging the concerns expressed by a customer, apologising for the problems they've experienced."

A positive response to a negative comment can go some way to turn the situation around, he says. Even if a brand fails to win that customer back, it may convince others to pay a visit.

"If a guest has taken the time to write about their service or their stay, they've asked us to listen, so we welcome this as an opportunity to have a dialogue with them," says Ben Ford, head of guest services at budget travel chain Premier Inn.

"And," Mr Ford adds, "if a review is negative, customers still want to see that we are listening and taking on board other guests' feedback."

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Networks join battle to control best TV shows

Media Established broadcasters are having to adapt quickly to the world of online competitors, reports *Henry Mance*

TV viewing habits and programme budgets in the 21st century

Production budgets

House of Cards
(Netflix, first two series)
$100m

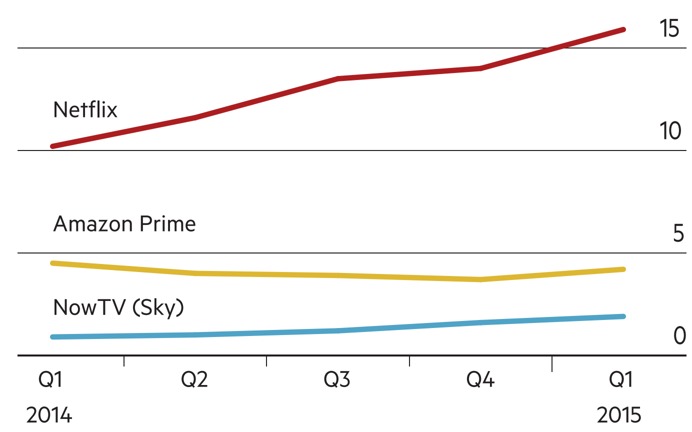
Jeremy Clarkson's new motoring show
(Amazon, three series)
$250m

Fortitude
(Sky, one series)
$25m

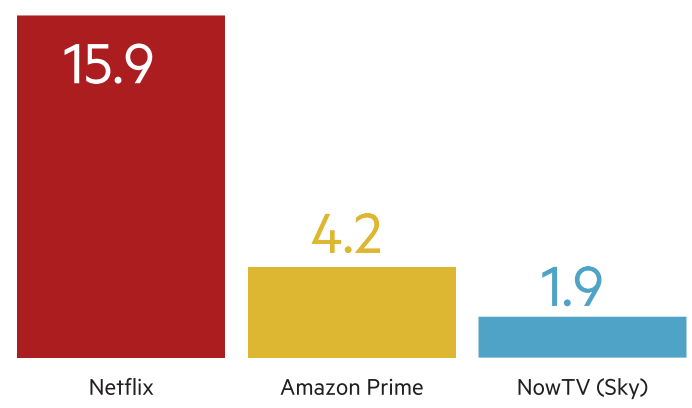
Sherlock
(BBC, one series)
£6m*

* Estimate

Subscription video services in the UK
% of UK households



Subscription video services in the UK
% of UK households, as of Q1 2015



Sources: FT research; Enders Analysis/BARB

People in the media industry are bored with hearing about the "death of television" — a prediction of a doom-laden event that has so far failed to take place. Despite this, broadcasters and pay-TV platforms are having to adapt rapidly to tackle digital upstarts.

Netflix and Amazon Prime Instant Video — which between them have more than 4m subscribers in the UK, according to estimates — do not compete for advertising spending. However, there is not much evidence to date that British consumers are choosing them over more expensive pay-TV packages from Sky, to which 12m households subscribe to directly or via Now TV, Sky's low-cost streaming service

Instead, the newcomers' challenge to broadcasters is less direct. It is forcing broadcasters to think about how to keep hold of the best content and to distribute it effectively. "If you're a content creator and a broadcaster, it's both an opportunity and a threat," says Richard Broughton, research director at Ampere Analysis, a data collection and forecasting specialist.

The opportunity is that Netflix and Amazon are willing to pay for older shows, providing welcome commercial revenue to those, such as the BBC, with an extensive back catalogue.

But that leads straight to a threat: Netflix and Amazon are also willing to pay for new shows, outbidding the traditional broadcasters. The BBC says that it was beaten by Netflix for the rights to *The Crown*, a six-series drama about the life of Queen Elizabeth II.

"We just couldn't compete with the money," said Danny Cohen, the BBC's director of television at the time.

This has contributed to programming inflation as the cost of the rights to the best show have risen by between 30 and 50 per cent in the past few years, says Darren Childs, chief executive of UKTV, owner of channels such as Dave.

Partly as a result, broadcasters are investing more in their own programmes. UKTV, previously best known for airing BBC reruns, now produces shows such as *Storage Hunters UK* and *Monty Python Live (Mostly)*.

ITV, the UK's biggest free-to-air commercial broadcaster, has acquired 12 production companies since 2012, including the makers of *Real Housewives of New Jersey*, *The Voice* and *Poldark*, at an expected cost of about £750m. About 60 per cent of programmes on its main channels are now made in-house, up from less than half in 2009.

> When should a broadcaster make shows available to Netflix and Amazon?

Anke Schäferkordt, co-chief executive of European broadcaster RTL, said in a recent interview that on the company's two main German channels the proportion of original commissions was "shifting from over 80 per towards 90 per cent". "I have no doubts that this will give us a huge competitive advantage over the next few years," she added.

In order to rival Netflix and Amazon's global scale, broadcasters are also looking for co-production deals, which allow costs to spread across more than one company. The BBC's *The Honourable Woman* was made with the US network AMC's Sundance TV. Sky's *The Last Panthers* is made with French pay-TV broadcaster Canal Plus.

Last year Sky also bought its German and Italian pay TV sister companies from 21st Century Fox, partly to give it greater strength in the content market. In the long term, many analysts expect streaming platforms to try to buy sports and entertainment rights on a global or regional basis.

Media businesses with an international reach will have a powerful advantage. For the moment, however, there are some programmes that only traditional broadcasters can make.

The BBC and ITV have produced more "live" programmes — such as episodes of soap operas *EastEnders* and *Coronation Street*, broadcast in real-time like theatrical performances — to keep viewers tuning in. The dilemma for broadcasters is if and when to make shows available to Netflix and Amazon. Some are holding back works for longer, says Mr Broughton of Ampere Analysis.

UKTV has not sold programmes to Netflix, which does not prominently display the branding of the individual producers on shows it broadcasts. However, it has launched a UKTV app for Amazon's Kindle Fire TV.

"If you're going to invest heavily in content, it has to be [aired] with your own brand," says Mr Childs. "That's where a lot of the battles are."

Broadcasters are rethinking how their content is delivered to audiences. ITV offers a premium player for £3.99 a month — where shows are available without ads, as they would be on Netflix or Amazon Prime. Sky has taken on Netflix directly by launching its own Now TV service in 2013, which allows viewers to access its best programmes and channels for £6.99 a month.

Sky has not, however, reached a deal to offer Netflix as part of a subscription package it offers. Nor will the Netflix app be available on Sky's set-top box, Sky Q, which goes on sale in early 2016.

"From a long-term strategic perspective, they're very keen not to encourage the success of a company that could become a competitor," says Ampere Analysis's Mr Broughton.

Intriguingly, however, Sky Q does allow viewers to access YouTube, including Whistle Sports, a youth-focused YouTube channel in which Sky invested $7m last year. This careful positioning of content emphasises the nuanced approach that the new environment requires.

"Sky would view YouTube as the evolution of free-to-air broadcasting," says Mr Broughton. "[YouTube] isn't premium content."

Disruption & Technology

The stuff of life: experts examining a model of a strand of DNA. Scientists have come up with several different gene editing tools — Alamy

Excitement rises over gene editing tool, but ethical doubts remain

Science Rearranging human DNA to eradicate disease could become an everyday reality, says *Clive Cookson*

The era of genetic engineering began in 1973 when scientists in California developed "recombinant DNA" techniques that enabled them to insert new genes into living cells. But until very recently the technology has been hit-and-miss, without a reliable way to direct DNA to exactly the right place in an organism's genome. As a result researchers usually had to attempt many cellular transformations in order to achieve the desired result.

Now a fast and accurate way of "gene editing" has emerged, which biotechnologists believe is the biggest technical advance in their field so far this century. It promises to accelerate genetic engineering across the board, from microbes and plants to animals and even humans, and make possible the extensive DNA rearrangements involved in the emerging science of "synthetic biology".

Although scientists have come up with several different gene editing tools over the past three years or so, most of the excitement is about Crispr (pronounced 'crisper', short for "clustered regularly interspaced short palindromic repeats").

This enables researchers to manipulate specific genes, adding, subtracting or changing DNA, far more quickly and precisely than ever before. Gene editing uses molecular machinery that bacteria have evolved to fight viral infection. It has two parts. One (Crispr itself) is a guidance molecule that can be targeted to any stretch of DNA. The other is an enzyme that cuts the DNA. So far scientists have focused on an enzyme called Cas9 to provide these molecular scissors. In September, however, Professor Feng Zhang and colleagues at Massachusetts Institute of Technology published details of an alternative bacterial enzyme, Cpf1, which works in a slightly different way.

Having cut the target in the right place, researchers can snip out unwanted DNA (such as a disease-causing gene), add DNA (to make a new product) or regulate genetic activity. The cut ends are then joined up again.

The patent position over Crispr remains uncertain, with competing claims from MIT, the University of California, Berkeley, and others, but that has not deterred the hundreds of laboratories in both the private and public sectors worldwide that are currently working with the technology.

For instance AstraZeneca, the UK-based drug company, announced four partnerships early this year "aimed at harnessing the power of Crispr across its entire discovery platform in the company's key therapeutic areas". By switching genes on and off in cell lines representing diseases from cancer to autoimmune and inflammatory conditions, the collaborators aim to identify a plethora of new drug targets.

Adding to Crispr's appeal is the fact that it is easy for researchers to handle, without the need for very sophisticated equipment or training. Indeed, its ease of use raises concerns that bio-hackers may use it for potentially hazardous synthetic biology experiments in unauthorised "garage labs".

> In official labs there is much debate about what research should be off limits for gene editing

Even in official labs there is much debate about what research should be off limits for gene editing. In April a Chinese team reported an attempt to remove disease genes from a human embryo. Although the embryo chosen was non-viable and could not have developed into a baby, the experiment ignited a storm of controversy over the ethics of editing the human germ line and introducing changes that would pass down the generations.

Then in September Kathy Niakan, a stem cell scientist at the Francis Crick Institute in London, applied for permission to undertake gene editing of early human embryos as part of a project to understand better the development of early embryos. Again, there is no intention to grow genetically engineered babies but the application aroused more controversy. These matters were scheduled to be discussed last week at a meeting convened in Washington by the US National Academy of Sciences to examine human gene editing.

Meanwhile scientific papers are beginning to appear on non-human applications of gene editing. Last week, for example, a team at the University of California reported the use of Crispr to make the Asian mosquito Anopheles stephensi, a carrier of malaria, resistant to the parasite that causes the disease. Although the experiment was just a lab demonstration, it could lead the way to field trials of resistant insects designed to supplant wild malaria-transmitting mosquitoes.

Last month scientists at Harvard Medical School used extensive Crispr editing to deactivate 62 sites in the pig genome where porcine viruses were lurking. The project was designed to show that these viruses, an obstacle to the use of pig organs such as hearts and kidneys for human transplantation, could in principle be removed to make xenotransplantation a safer prospect. Again, this was a lab experiment, carried out with pig cells, that will need many years of development to produce live, virus-free animals as a source of transplantable organs.

China, which is making a strong push into animal biotechnology, has started dozens of studies to apply Crispr to agricultural livestock, monkeys, dogs and other mammals. One of the most eye-catching projects is to produce "micro-pigs" that will not only be studied as models of disease but also sold as pets.

Travel and tourism Explore holiday destinations before you book

In the past, "virtual reality" in the tourism industry has typically meant websites where users can click to explore the inside of a building. Now, more advanced headset technology from the likes of Facebook, Google, Sony and Samsung will allow customers to try before they decide to pay.

Booking holidays has always been a gamble. Prospective travellers scan websites, read dozens of reviews and meticulously research a destination before making a decision and putting their money on the table.

But consumers never know quite what they have got themselves into until they arrive, unpack their bags and realise the hotel they booked was not quite as the pictures suggested.

Now hotel chains, tour operators and tourism boards are using virtual reality to let customers experience products and destinations before they part with cash, deploying headsets to give them a taste of helicopter rides above New York and pristine Pacific beaches, in an attempt to boost sales and raise customer satisfaction.

Last year, Marriott International, the hotel operator, unveiled the Teleporter, a phone-box like structure that users stood in while wearing an Oculus Rift headset to be virtually transported to a black sand beach in Hawaii or the top of the Tower 42 skyscraper in London.

Destination British Columbia, a tourism body, has created similar experiences that let people explore the rivers and forests of Canada's western province.

Travel agency Thomas Cook has rolled out Samsung Gear headsets at a handful of stores in the UK, Germany and Belgium. The technology may give customers an incentive to visit its shops, which have suffered as holiday bookings have moved online.

Kathryn Darbandi, Thomas Cook's UK director of retail and customer experience, says early feedback from stores suggests the headsets have "inspired some customers to book trips and excursions they may not have considered".

She adds: "The technology seems to have really captured people's imaginations by bringing to life holiday experiences in a way a brochure or a video can't."

Henry Stuart is the founder of Visualise, a London-based production studio that made Thomas Cook's virtual reality content. His company has worked on in-flight VR experiences for Qantas and filmed sharks in South Africa with 360-degree cameras to make VR content for the country's tourism board.

He expects the technology will not only be used at the point of purchase but also

Insight: Oculus Rift gives people a virtual experience

while consumers are on holiday in a bid to encourage them to go on excursions.

"You can put a headset on [in your hotel], do a little quad biking over some dunes, or go scuba diving and decide what you want to do," he says.

Virtual reality has developed in fits and starts over the decades. A rush of enthusiasm for the technology in the early 1990s died away after users found the screen resolution too low to produce a truly realistic, immersive experience.

The Oculus Rift was originally financed after a campaign on Kickstarter, the US public benefit company and a crowdfunding website. The product has helped to create a new wave of excitement about virtual reality. Last year, Facebook paid $2bn for the company, which will release its first consumer product early next year.

"That was a catalyst moment," says Simon Gosling, chief executive of Happy Finish, which produces virtual reality content for companies and advertisers.

The publicity around the deal and Facebook's backing of the technology tipped the balance for consumer-facing companies who began taking virtual reality more seriously, he says.

So far travel groups have had to purchase the hardware, as well as commission the content, in order to tap into the potential of virtual reality.

Mr Gosling says moving beyond the limited usage that exists now will require widespread access to the hardware, but also online streaming platforms to host the video content.

"Gaming will be a key component of pushing the availability of VR," he says, adding that moves by YouTube to add virtual reality functionality on its website and apps will also be crucial.

Dimitrios Buhalis, director of the eTourism Research Lab at Bournemouth University, says that in the long term, virtual reality will "whet the appetite" for travel rather than encourage would-be tourists to stay at home.

Mr Buhalis says: "It's not going to replace travel. It will enable people to have more realistic expectations and to choose better."

Kadhim Shubber

Marketers still need to learn how not to annoy potential customers

Social media

Platforms are no longer working well for companies, says *Maija Palmer*, so what comes next?

How many brands do you have in your kitchen, bathroom and office? The answer is probably somewhere between 500 and 1,000. Now think about how many of their makers you want to send you social media messages. A tweet from the maker of your bathroom hand-basin? A Facebook post from the toaster company?

"The answer is inevitably fewer than 10, and therein lies the problem," says Augie Ray, a former marketing analyst and social media expert who gives this exercise to social media marketeers.

He adds that people do not like to be sent marketing messages and want to be in control of how they interact with brands. Yet social marketers are pumping out more messages than ever. Research by Adobe Digital Index showed that brands posted 31 per cent more frequently on Facebook in the first quarter of 2015 than in the same period a year earlier. But consumers are turning off brand messaging. About 69 per cent of British consumers have "unfollowed" brands on social channels, closed accounts and cancelled subscriptions to avoid unwanted messages, says a study by Aimia Institute, owner of the Nectar loyalty programme in the UK.

Social media accounts for less than 1 per cent of ecommerce purchases, says Custora E-Commerce Pulse, a company that tracks online transactions. Email accounts for 16 per cent.

In an effort to find buyers on social media, marketers are looking beyond Facebook and Twitter. Instagram, the Facebook-owned, photo-led platform, is relatively uncluttered with advertisements and some companies achieve good results there.

Nikolay Piriankov, founder of Rare Pink, an online jewellers, says his company has far more engagement with customers on Instagram. "While we have been working with social media sites such as Facebook and Twitter, we just don't see as many conversations happening there that lead to a sale," he says.

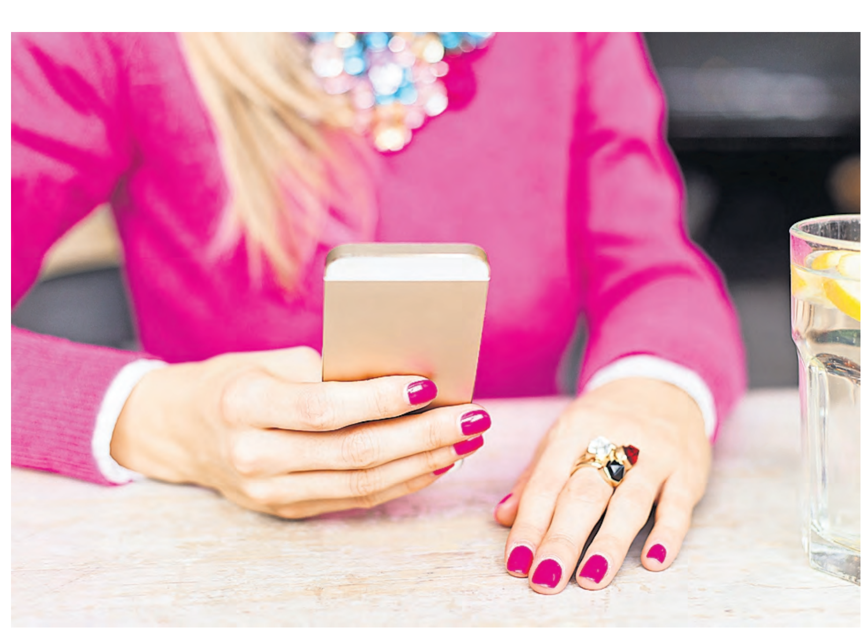
Potential customers will discuss and share photos of the company's designs more extensively on Instagram, he adds. "We are not selling to them, we are inviting them to have a conversation with us." These observations agree with research by Locowise, a social media analytics company, which in April said that about 2.80 per cent of followers engaged with posts on Instagram, either by liking or commenting on them, compared with about 0.2 per cent on Facebook and Twitter.

Companies are also exploring the potential of so-called chat apps, such as WhatsApp and WeChat, which let users instantly message each other, send images and talk to one another.

Rare Pink began using WhatsApp after a customer request. "It was a lady working at an investment bank who couldn't browse sites from her work computer and didn't want to email from her phone," Mr Piriankov says. "She ended up buying a £13,000 ring over WhatsApp after building up a real rapport with the designer."

Mr Piriankov says about 10 per cent of his clients now choose to use WhatsApp.

But talking to individual customers via chat apps can be time-consuming and may only work for businesses selling expensive, customised items. "It isn't something that will work for everyone," Mr Piriankov admits. "It is mainly companies that build relationships that should use WhatsApp."



Customers at hand: clever use of social media can boost sales — Dreamstime

Lisa Pybus, who runs Gloriarty, an art supply and jewellery company says: "Message apps still feel like going up to someone's front door and shoving junk mail through their letter box. If customers want to talk on apps, all well and good, but the last thing you want to do is annoy your customers."

Another way to improve social media success might be to rethink how companies use it. Rather than broadcasting marketing messages, social media should be about a two-way conversation. "The broadcast channel element of social media has been very prominent from the start, but the potential for it to be a communication channel has really been missed," says Andrew Caravella, vice-president of marketing at Sprout Social, which supplies social media management software.

Sprout's research shows that brands tend to ignore customers who send messages via social media. Seven out of eight customer questions went unanswered in 2015. When brands did respond, it took them on average 12 hours to do so.

Simple things might improve the customer service on social media. KLM, the Dutch airline, for example, says on its Twitter profile how long it will take for customers to receive a reply.

Keeping existing customers happy is important. Some experts say businesses have a 60 to 70 per cent chance of selling to an existing customer who may connect using social media, while the probability of selling to a new prospect is only 5 to 20 per cent.

If businesses are interested in sales, rather than traffic to sites, then social media does have a place, but companies have to learn how to use it.