Vision Review

Edition 15

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Reviving our High Streets

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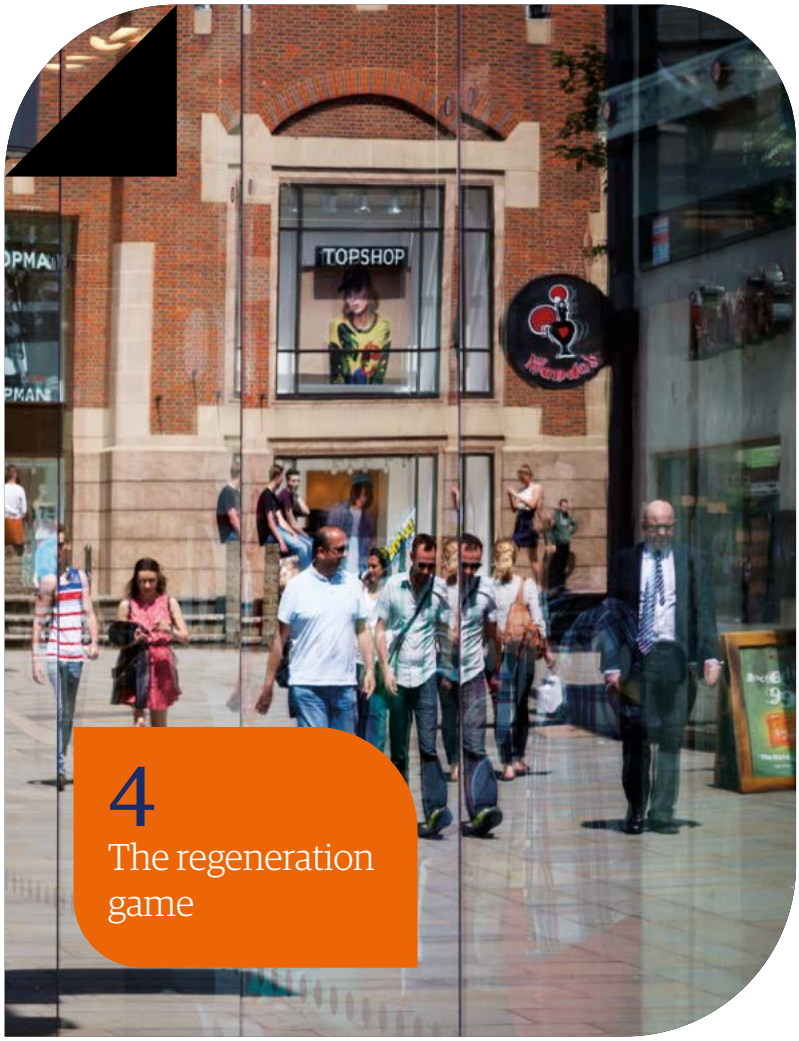

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Welcome
to the latest edition of *Vision Review*

"There are more things in heaven and earth, Horatio," Hamlet observed, "than are dreamt of in your philosophy." Today heaven and earth alike are increasingly in thrall to two phenomena that neither Shakespeare nor his tragic prince could have dared imagine: the power of market forces and the innovative brilliance of technology companies.

Space has recently emerged as the newest and most dramatic frontier for cutting-edge private enterprise. As in any business arena, the advent of entrepreneurship brings the promise of both risk and reward. We explain how the unfolding commercialisation of the cosmos is giving rise to legislative, regulatory and political questions – as well as unprecedented investment opportunities.

Meanwhile, back on terra firma, the UK's High Streets continue their struggle to adapt in the face of another tech-driven shift: the relentless ascent of online shopping. In our lead article we explore efforts to revive the traditional retail experience in the face of this seemingly irresistible threat.

Other topics in this edition include the complex world of "urban mining", the search for new antibiotics, the renaissance of prefab housing and the chequered history of the world's most famous doll. We also examine changing dietary habits, the cost of later-life care, the merits of intergenerational wealth planning and the nuances of the lifetime mortgage market.

Elsewhere, there is more good news from a Vision perspective. We are delighted to have once again been shortlisted for the *Professional Adviser Awards* and for the Cornwall Business Awards, where we have a chance of being crowned Business of the Year.

We are extremely grateful for these nominations, and I would like to thank you, our clients, because your endorsement of the service that we provide is ultimately what matters most to us.

I hope you enjoy this edition of *Vision Review*. As always, your feedback is very welcome.

Paul Sweaton
Chief Executive of Vision

Editor
Jenifer Hall
Network Support Manager

If you have any comments on this publication or suggestions for topics that you would like to see discussed in the future, please let me know.

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What is going to happen to our High Streets?

The British High Street has always been susceptible to the vagaries of the economic cycle. It has survived wars, recessions and the rise of out-of-town retail parks. But the internet may pose one threat too many. Can our High Streets survive – and what will they have to become to do so?

Graham Waddell

Coffee shops, tearooms and restaurants increasingly dominate many of Britain's High Streets as traditional retailers succumb to the rise of online shopping. This is the scene in Rochester, Kent.

The Centre for Retail Research (CRR) keeps a running tally of the major retailers entering some form of insolvency in Britain each year. It makes grim reading. Last year 43 shut up shop, including famous names like HMV, Greenwoods, Evans Cycles, House of Fraser, Poundworld, Henri Lloyd, Maplin and Toys 'R' Us. Some, like House of Fraser, were resurrected – but only following deep cuts.

This chain-store massacre resulted in the loss of 2,594 shops and over 46,000 jobs, but the true picture is much bloodier. Other big names have had to take drastic steps to survive. Carpetright announced it was to close 92 of its 400 branches, Mothercare 50 of 137, Debenhams 50 and New Look 85. Smaller businesses are closing each day without media ceremony. The CRR estimates that overall nearly one in five stores has closed on our High Streets since 2012.

A number of factors are held to blame, including weak consumer demand since the 2008/2009 crisis, intensive price competition and our growing preference to spend on 'experiences' – like travel and eating out – rather than 'things'. But the biggest threat is the internet. Latest figures from the Office for National Statistics show that online spending now represents around 18% of all retail in the UK – the equivalent of £61.4 billion. It is almost double what it was just five years ago and is expected to rise to nearly 23% by 2022.

Surveys suggest that lots of factors drive us online. The ability to shop at any time from your sofa, the ability to compare prices and products, the ability to see reviews from fellow shoppers – all make shopping on the internet a much better experience for many. And then, of course, there is price.

Level taxation

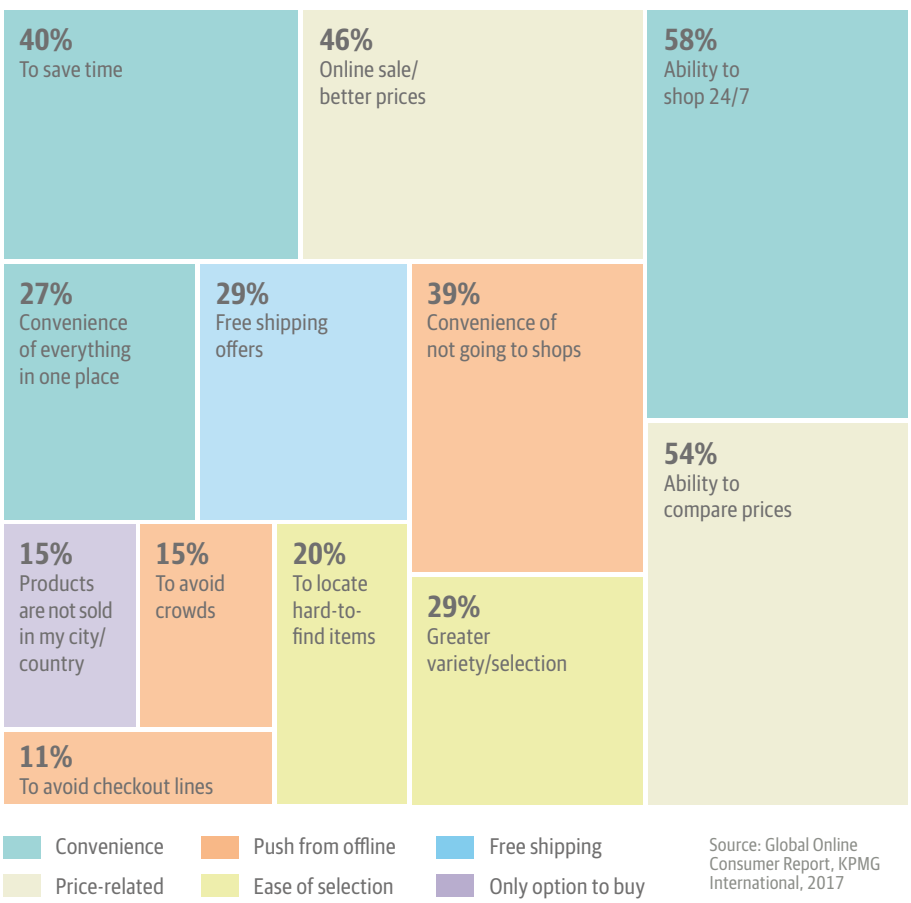
One of the biggest advantages e-tailers have over bricks-and-mortar stores is lower costs – lower rents and lower rates mean they can charge lower prices. Inevitably, the starting point for many when seeking to rescue what is left of the High Street is to find a way to level the playing field. For most this means addressing the archaic model of business rates – a pre-internet property-based tax that raises £29 billion a year, an undue proportion of which is squeezed out of beleaguered retailers. The retail sector accounts for 5% of gross domestic product yet pays 25% of business rates.

> "Online spending now represents around 18% of all retail in the UK."

The Parliamentary Housing, Communities and Local Government Committee recently published a report, *High Streets and Town Centres in 2030*. It found that Amazon UK's business rates amounted to just 0.7% of its UK turnover, while High Street retailers were paying up to 6.5%. It welcomed the new 2% digital services tax that large online businesses will start paying from next April, but it warned that this does not go far enough in addressing the tax imbalance between online and High Street retailers.

Mike Ashley, the pugnacious chief executive of the Sports Direct Group, was one of those called to give evidence to the inquiry. He told the Committee: "The vast majority of the mainstream High Street has already died... It's in the bottom of the swimming pool – dead... [The rest] is flat-lining. The only thing you can do is give it a massive electric shock."

Reasons consumers shop online instead of in stores



Source: Global Online Consumer Report, KPMG International, 2017

His cure was a 20:20 internet sales tax for businesses – a 20% tax on all companies that make more than 20% of their revenue from the internet. This would affect not just companies like Amazon but also many High Street stores, including his own. He said it would incentivise retailers to keep 80% of revenues going through the High Street, stalling store closures and encouraging cross-subsidisation and click-and-collect. In return, councils would need to offer free parking for shoppers. He complained: "You still get some towns that charge for parking. Therefore, you have negated the whole free click-and-collect voucher, because they have to pay it all away on parking fees."

Ashley said that such a tax would have to be accompanied by business rate reductions – in return for retailers committing to invest in High Street stores – and cuts in rents. The Committee failed to back his idea but urged the government to assess other online sales tax ideas, including "green taxes" on deliveries and packaging.

The Committee also recommended that any such taxes should be used to subsidise a cut in business rates for retailers and to add to the government's £675 million Future High Streets Fund – a pot of money that towns can bid for to help fund town-centre regeneration projects.

But a healthy High Street may need more than a level playing field for taxing retailers. Think-tank Centre for Cities says too much attention has been paid to the plight of shops and not enough to the wider economic factors that contribute towards a healthy city centre.

"The retail sector accounts for 5% of gross domestic product yet pays 25% of business rates."

Image: Made.com

If the High Street is to survive it needs to attract the millennial generation. Money blogger Bronni Hughes offers suggestions for change.

The High Street is no longer the cheapest or most convenient place to shop and the selection of goods is almost guaranteed to be wider on the internet. But online shopping has its pitfalls – you have to wait for delivery, you cannot see the item before you buy and returns can be awkward to post.

Connect online: Retailers could make more effort to connect their online presence with their bricks-and-mortar shops to offer the best of both worlds. Allow us to check in-store stock levels easily online, encourage click-and-collectors to unpack and try their order out and return items that are unsuitable while in the building.

Improve your hours: Commutes are getting longer and traditional opening hours do not work. A millennial customer might prefer shops to be open 12-8 instead of 9-5 on weekdays (and longer on Sundays too).

Stay central: Fewer young people drive nowadays, so out-of-town shopping is impractical. It is no coincidence that many stores going into administration tend to be retail park staples.

Offer something different: Shopping in-store has become less of a necessity to young people – it is something we choose to do as a social activity. There is almost too much choice online, so shops should aim for a boutique feel, with new merchandise that is not something you could buy in a hundred other places. Hold less stock and instead refresh shelves with exciting new items more frequently, to make talking points for people shopping with their friends and to encourage them to return to see what is new.

Focus on experience: Millennials have become known for saving up for experiences rather than things, and retailers should take note. You cannot buy anything in Made.com's central London showroom – it is there simply to let you look. There are no pushy salespeople and it is a pleasant place to browse, sit on a sofa and chat – the antithesis of a cluttered old-fashioned High Street shop with harsh fluorescent lighting.

Be social: When your shop and stock look good, share it. Being beautiful on Instagram works for cafes, and retailers should not ignore it – more than half of millennials say their purchases are influenced by social media.

Paul Swinney, an economist at the Centre, says: "Our research shows that sluggish retail is the *symptom* of an underperforming city centre, not the *cause* of it. If a city centre lacks jobs, residents and leisure amenities, which are the primary functions of city centres, then this will shrink the size of the market that a secondary activity such as retail can serve."

Swinney points to contradictory local government strategies that have incentivised the building of business parks and Enterprise Zones on the outskirts of communities rather than at their heart, taking jobs out of city centres. These are often poorly served by public transport and in retail wildernesses that offer little to workers.

Centre for Cities argues that there is a clear correlation between city and town centres that have a strong nine-to-five working week population and those with thriving shops, restaurants and cafes. These workers provide custom from Monday to Friday; shoppers on Saturday and Sunday.

Repurposing

Others are increasingly recognising that the challenge is no longer merely to keep alive shops but to keep alive town centres themselves. This means finding positive uses for some of Britain's 50,000 empty shops.

Creating high-quality office space is one solution. Many favour another – turning superfluous retail space into housing.

"There is a clear correlation between city and town centres that have a strong nine-to-five working week population and those with thriving shops, restaurants and cafes."

Investment impact

Retailer share prices reflect the struggles facing the sector, but this is not the only area of the market to be challenged by the digital shopping revolution. As retailers have shut up shop, property owners have found themselves with empty properties they are struggling to fill. Many are coming under intense pressure from remaining tenants to reduce rents and offer rent holidays.

The share prices of real estate investment trusts (REITs) with large exposure to retail have suffered heavily in the past year. Some are trading at discounts – in other words, the total share value of the trusts is lower than the actual value of the properties they hold. This may make them look like bargains, but they can fall further.

In contrast, property trusts investing in the warehouses and distribution centres upon which online retailers depend have seen strong growth and have been among the best performers in the sector. This market may be becoming saturated, though, and values may be peaking.

Mike Ashley had suggested converting the top floors of Birmingham's 500,000 sq ft House of Fraser store into flats. Others see opportunities to create social housing and specialist residential facilities for an ageing population. Each would instantly generate an increased footfall.

Phil Prentice, chief officer of Scotland's Towns Partnership, which supports town-centre regeneration, wants communities to think creatively as well. In Edinburgh, Diageo is blending the retail and entertainment experience by opening a Johnnie Walker visitor centre on Princes Street. That may not work generally but Prentice asks: "What about libraries, galleries, art centres, health centres, nurseries, crèche facilities, playzones, business incubators, hatcheries and co-working spaces and gyms? Let's bring in farmers' markets, events and activities, better food-and-drink offerings, concerts, boutique cinema and performance."

Prentice also wants a blurring of the lines between what has been described as 'bricks and clicks'. He wants High Street stores to have a strong web presence and more customer-friendly opening hours, so encouraging click-and-collect. And he wants to encourage the emerging trend of digital traders developing a showroom presence on the High Street.

Stockton-on-Tees has become a role model for reversing the trend of High Street decline.

That is already beginning to happen – popular online retailer Boden, after nearly 30 years of trading online, now has three physical shops. Meanwhile Ikea has just launched small stores on Tottenham Court Road and in Bromley, where shoppers can order home delivery on items and plan kitchen and bathroom refits. Prentice and other specialists argue that each town or city has to develop a solution that taps into its distinct heritage and that is appropriate for its community. One example is Motherwell. Better partnerships between the council, transport providers, community groups and businesses and the hosting of community events and festivals have helped create a cleaner, greener and more attractive, family-friendly environment. This in turn has enabled the town to attract new tenants, including Costa, PureGym and Warren James. Footfall has increased, while vacancies have been slashed.

Stockton-on-Tees is another role model for communities that have managed to reverse the trend of High Street decline. Its award-winning £38 million regeneration project included the creation of an attractive water feature and open-air theatre space in the centre of town. This has allowed the town to host specialist markets and cultural activities, including a cycling festival, street theatre and fireworks, and has put the centre at the heart of the community.

Cathy Hart, a senior lecturer in retailing at Loughborough University School of Business and Economics, says: "The future doesn't have to be one of dereliction and decay. There's no single answer to the High Street problem, but fundamental to any approach is ensuring that people enjoy the town-centre experience and have a reason to revisit, whether for shopping, social or experiential purposes. People still like the human interaction of shopping with family and friends and communicating with service staff. They still want to see and feel what they're buying, and they want choice. Town-centre management will have to work hard to retain big-name 'anchor' stores but also to ensure there's a diversity of shops on the High Street. Centres need to embrace and integrate digital technology, offering free wi-fi and dedicated apps to ensure that the internet supports rather than supplants the town-centre experience.

An open and shut case

Net increase and decrease in retail units in the first six months of 2018

Source: the Local Data Company

"A healthy community needs a healthy hub."

"A healthy community needs a healthy hub. By putting homes, work and healthcare facilities in centres you immediately create an ecosystem that can sustain more shops, as well as cafes, cinemas and leisure facilities. By investing in good transport, access and a welcoming environment you make town and city centres places we want to congregate in. By resolving the business rates issue and creating more flexible retail spaces you nurture independent businesses. This becomes a virtuous circle."

High Streets and Town Centres in 2030 reached a similar conclusion. Its authors said: "We are convinced that High Streets and town centres will survive – and thrive – in 2030 if they adapt, becoming activity-based community gathering places where retail is a smaller part of a wider range of uses and activities. Green space, leisure, arts and culture and health and social care services must combine with housing to create a space that is the 'intersection of human life and activity', based primarily on social interactions rather than financial transactions."

But the report also issued a bleak warning that many town centres could die completely, fracturing the communities on which they depend. The task of revitalising town centres requires coordinated action between central and local government, retailers, landlords and local communities. And it needs it soon.

Images: Chapman Brown Photography, Paolo Paradiso/Alamy

The hunt for new antibiotics

Hardly a week goes by without a report of someone dying because of an infection from an antibiotic-resistant superbug. Amid mounting fears of a "post-antibiotic" age, scientists are pursuing a variety of innovative routes in the quest for new treatments.

Kate Elliot

In 1928 an untidy researcher studying influenza in a London hospital accidentally left a Petri dish contaminated with Staphylococcus lying in the corner of his laboratory. He then went on holiday for two weeks. On his return, Alexander Fleming found that a fungus had formed on the bacteria, preventing its growth. Penicillin was born.

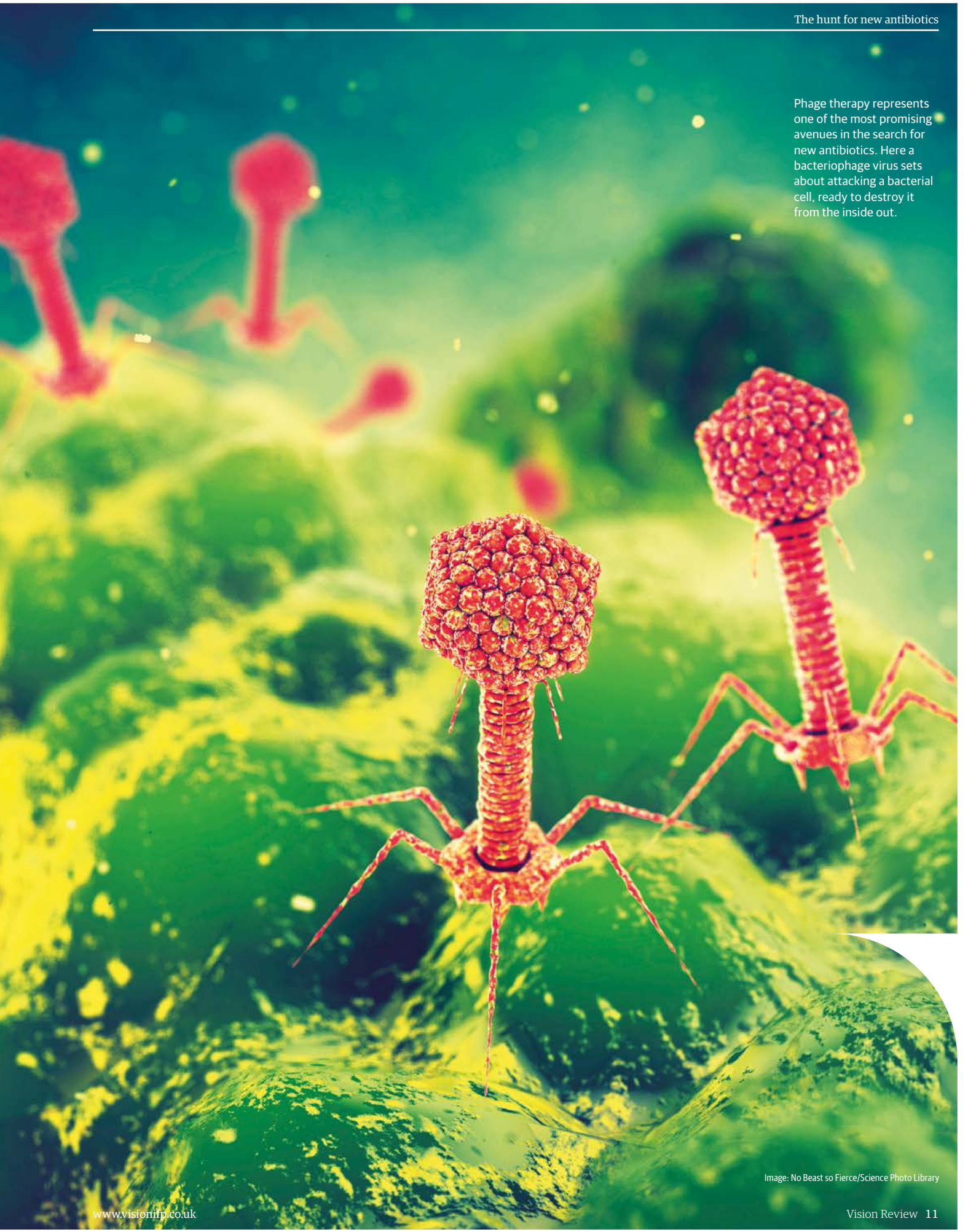
Fleming was not the first to understand the antibacterial qualities of mould. The ancient Egyptians had already applied mouldy bread to wounds. But this particular mould, when grown in a pure culture, was found to be especially potent, killing a number of disease-causing bacteria.

Other scientists carried on Fleming's initial work, and by 1945 penicillin was available for general use. Just a year later Fleming himself was warning of the dangers of overusing antibiotics. "The thoughtless person playing with penicillin treatment is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism," he told readers of the *New York Times*. "I hope the evil can be averted."

It seems that the temptation to resort to antibiotics has been too great. The most recent figures show that Britons consumed over 491 tonnes of antibiotics in 2017. Animals – livestock, horses and pets – consumed another 282 tonnes.

Inevitably, antibiotic resistance is increasing. With no new antibiotics discovered in 30 years, the World Health Organisation (WHO) says we are facing a serious global threat.

The WHO's worries are especially focused on the emergence of so-called superbugs, such as methicillin-resistant Staphylococcus aureus (MRSA) and Clostridium difficile (C. diff), which are extraordinarily difficult to kill. These superbugs are already responsible for 700,000 deaths a year, and a 2014 study – led by economist Dr Jim O'Neill and produced for David Cameron – warned that they could kill more people



Phage therapy represents one of the most promising avenues in the search for new antibiotics. Here a bacteriophage virus sets about attacking a bacterial cell, ready to destroy it from the inside out.

Image: No Beast so Fierce/Science Photo Library

Alexander Fleming discovered penicillin after absent-mindedly leaving a contaminated Petri dish in his lab for two weeks. He returned from holiday to find that mould had prevented the growth of bacteria.

than cancer by 2050, at a cost of £63 trillion to the global economy.

In January this year it was reported that genes associated with antibiotic superbugs have been discovered in water in the High Arctic. Researchers were justifiably puzzled, since there is so little human activity in that part of the world and the superbug genes matched ones first identified in Delhi. Scientists now believe that the genes were carried north by migrating birds that picked them up in surface water contaminated by sewage in India.

"We cannot tackle the rise of antimicrobial resistance without focusing on water, sanitation, hygiene and infection prevention control," says Helen Hamilton, a senior policy analyst at WaterAid. "In today's globalised world, a drug-resistant infection in one part of the world will not be constrained by national borders."

Searching for cures

With the scale of the problem now beyond question, a number of entirely new methods for curing bacterial infections are being explored. Two in particular, phage therapy and phytochemicals, show promise.

> "With no new antibiotics discovered in 30 years, the World Health Organisation says we are facing a serious global threat."

Bacteriophages, known as phages for short, are a type of virus that infects a bacteria cell. The phage inserts its DNA into the bacteria and creates proteins that kill them by making holes in the cell wall from the inside out. Phages are very specific in the bacteria they attack, so that the naturally occurring good bacteria are unaffected, which means that they do not cause the stomach problems associated with antibiotics.

Phytochemicals are plant-derived compounds that have a pharmaceutical action. They are present in certain fruits, grains and vegetables. The most common are antioxidants, which have been associated with reducing the risk of cancer. Scientists are now hunting for phytochemicals with antibiotic properties.

Meanwhile, Vedanta Biosciences, based in Cambridge, Massachusetts, is trying another approach – enhancing the microbiome, the vast army of microbes in your body that protects you from disease and breaks down your food. By collecting healthy samples from people around the world, mixing them together and delivering them in pill form, Vedanta hopes to build a stronger immune response in microbiomes weakened by overexposure to antibiotics.

University of Colorado Boulder researchers working on developing quantum dots – tiny crystals of semiconductors that could harness solar energy to make fuel – knew the technology had already been used for imaging in cancer research. By teaming up with colleagues developing new antibiotics, they have developed a novel type of quantum dot that can selectively target bacteria.

The dots are tiny. As researcher Prashant Nagpal says: "A quantum dot is to the width of a hair roughly what a city block is to the Earth." The hope is that the dots can be placed in a patient's body and then be activated using a targeted light source to clear infections in specific places. The dots would be very cheap to produce, and – at least theoretically – they would require a dose one million times less than traditional drugs.

In another example of repurposing existing technology, a star-shaped polymer developed 15 years ago to add viscosity to automotive paints and engine oils was found to have the capability to deliver anti-cancer drugs. Then scientists at the University of Melbourne found that a version of the polymer, called SNAPP (Structurally Nanoengineered Antimicrobial Peptide Polymers), was toxic to bacteria.

Exploring unusual avenues

The pharmaceutical industry was almost exclusively focused on antibiotics in the

Images: St Mary's Hospital Medical School/ Science Photo Library, Stephen Ausmus/US Department of Agriculture/Science Photo Library

wake of the Second World War, but scientists have now devoted more than half a century to building on the molecular scaffolds erected during that era. The point of diminishing returns has long since been reached. Now much of the industry has moved on to less frustrating challenges.

"You might be able to squeeze one or two compounds out of these classic scaffolds, but they just don't have much more to give," says Eric Gordon, co-founder and chief scientific officer of US-based Arixa, which is developing novel resistance-defeating compounds that can be administered alongside antibiotics. "Most people think that with a big cash infusion we would be sailing along again, making antibiotics. But the fact is that nobody knows how to make them anymore."

It is this worrying reality that is compelling researchers to explore ever more unusual avenues. Scientists at Oregon State University, for instance, are investigating whether an answer might lie in the layer of mucus that coats the outer surface of young fish.

Their interest stems from the fact that this mucus helps protect fish from harmful bacteria, fungi and viruses. "We believe the microbes in the mucus add chemistry to the antiseptic power of the mucus and that new bioactive compounds might be discovered from the fish microbiome," says Dr Sandra Loesgen, head of the research group.

Perhaps the most unusual search of all is being carried out by an international group of medieval historians, microbiologists, medicinal chemists, parasitologists, pharmacists and data scientists. Known as the AncientBiotics team, they are combing ancient texts for medieval medicines of the past. A 1,000-year-old Anglo-Saxon eye-salve recipe, which contains a mix of wine, garlic, allium and ox gall left to ferment for nine nights, has been found to kill MRSA in mice.

Fields of innovation

The overuse of antibiotics in farming is a key part of the problem. Richard Pearson, a specialist pig vet based in Wiltshire, discovered a simple way of helping farmers to eliminate enzootic pneumonia from their herds and reduce the use of antibiotics. Instead of dosing newborn piglets with a protective antibiotic, farmers dosed the mothers. Mr Pearson explains: "In effect, this targeted treatment of 4,000 sows removed the need to treat the 100,000 pigs they produce annually."

Another approach is championed by the #ColostrumIsGold campaign, which is run by the Responsible Use of Medicines in Agriculture Alliance (RUMA). It involves ensuring that baby animals receive sufficient amounts of their mothers' milk soon after they are born. Just after birth, the so-called first milk — or colostrum — of cows, sheep and pigs is full of antibodies, energy and essential nutrients. Delivering it at the right time can eliminate watery mouth E. coli infection in lambs and halve the cases of pneumonia in calves.

> "Perhaps the most unusual search for treatments is being carried out by an international group of historians combing ancient texts for medicines of the past."

Work of this kind is not without precedent. Chemist Tu Youyou, who was awarded the Nobel Prize in Physiology or Medicine in 2015, searched more than 2,000 herbal treatments from ancient Chinese literature before discovering a new malaria therapy. It could well be that the most effective cures of the future lie in the past.

Wherever they might be found, the race to find answers is becoming increasingly urgent. The greatest fear is that bacteria have become so adept at cultivating resistance that this is a fight that we can prolong but never win. "We risk living in a post-antibiotic era," says Floyd Romesberg, a researcher in natural antibiotics at California-based Scripps Research. "We're buying time. You just have to keep running as fast as you can to stay in place."

Image: Roy Garner/REX/Shutterstock

Modular homes

At the end of the Second World War, with two million homes destroyed by German bombers, the government turned to prefabrication to help solve the housing crisis. Could it now hold the answer to modern Britain's housing woes?

Adam Greaves

In 2017 the wrecking ball finally crashed through south-east London's Excalibur estate of post-war prefabricated bungalows. In the wake of a campaign by residents to save them, six were left standing, given listed building status by English Heritage as testimony to their role in British history and their remarkable durability.

The 189 homes in Catford had been built in the late 1940s as part of former Prime Minister Winston Churchill's solution to the damage of the Blitz. Britain was facing a housing crisis and "prefabs" were the obvious, albeit temporary, solution. Designed to last for a decade, they could be rapidly constructed and boasted exciting mod-cons, like indoor toilets. Eventually over 156,000 were built.

Fast-forward three quarters of a century and the country's need for housing is arguably as desperate as it has ever been.

Lofty target

Research by Heriot-Watt University suggests the UK needs to build 340,000 homes per year until 2031 to meet the backlog of demand, and that 145,000 of these need to be social housing. Given that just

"The UK needs to build 340,000 homes per year until 2031 to meet the backlog of demand."

163,420 houses were built in the year to September 2018 (the latest data available from the Ministry of Housing, Communities & Local Government), there is some distance to go.

Could modern prefabricated housing – now re-christened 'modular' – once again hold the answer?

Today's modular homes are precision-built in factories and transported by road as pods that simply have to be fitted together and plumbed in at their desired location. Notionally this means quicker builds at cheaper prices.

Typically, it takes 40 weeks to build a traditional house. Because the parts are constructed indoors, modular house construction is less susceptible to delays arising from bad weather. Ilke Homes, which began building modular houses at its factory in Knaresborough last year, usually completes construction in under 10 days. Likewise, Legal & General Modular Homes properties – made near Leeds – take just days to complete. Fledgling business Creating Enterprise, launching in Holyhead in Wales, claims its timber homes will be made in two days and erected in 10.

But what about the quality? The residents of Catford may have fought for their prefabs, but few others found them so appealing. Sarah Curtis, a director of estate agent Strutt & Parker, says: "By today's standards, these homes were poorly constructed and leaked heat like a holey bucket. Many prefab homes are listed in the Housing Defects Act and, unless they've been fully refurbished, it's almost impossible to get a mortgage on one."

That reputation hangs over the sector but things have changed a lot since an inside toilet was considered the height of modern living.

A key feature of modern modular buildings is typically their eco-friendly design. Ilke claims its homes are a fifth cheaper to heat than new-build traditional homes and half the cost to heat compared to the average UK home.

In Germany, where there is a long tradition of wooden houses being pre-built in sawmills, more than 20% of houses are now modular and the sector is growing. German builder Huf Haus shows just how good modular housing can be. It has had a UK division for 10 years, building glass and wood or steel designer homes that would grace any episode of Channel 4's *Grand Designs*.

Huf Haus claims to have built over 200 houses in the UK in the past decade. That will do little to solve the country's housing crisis. Not surprisingly, most of the newcomers in Britain are focused on the challenge of building high-quality low-cost housing.

At 27 storeys, Pocket Living's Mapleton Crescent social housing development in Wandsworth is one of the tallest residential modular towers in Europe. Each flat was built and fitted out off-site then craned into place – a storey a day. A few miles south a pair of 38- and 44-storey towers, containing 546 new homes (over a hundred classed as affordable housing), are close to completion in Croydon. The taller of the duo will be Europe's tallest modular building. The developers chose modular construction because they argued that it delivers a higher-quality finish, with 80% less waste and greater certainty on costs and time.

The buildings demonstrate that modular need not be an inferior social housing solution. But Will Jeffwitz, policy leader at the National Housing Federation, which represents housing associations

Tallest modular structures in the UK

101 George Street, Croydon

38- and 44-storey towers – residential

Due to be completed in 2020, this will be the tallest modular development in Europe. It will provide 546 new homes, as well as a ground-floor civic space including an art gallery, artist studios, a cafe and a green space.

Apex House, Wembley

29-storey – student accommodation

Currently Europe's tallest modular building. Modules are made from steel frames and concrete floors and finished internally upon delivery. The entire building took just 12 months to complete.

Mapleton Crescent, Wandsworth

27-storey – residential

Each unit arrived on site complete with plaster, paint, windows, doors, wiring, plumbing, bathrooms and tiles, before being craned into place at the rate of one storey per day.

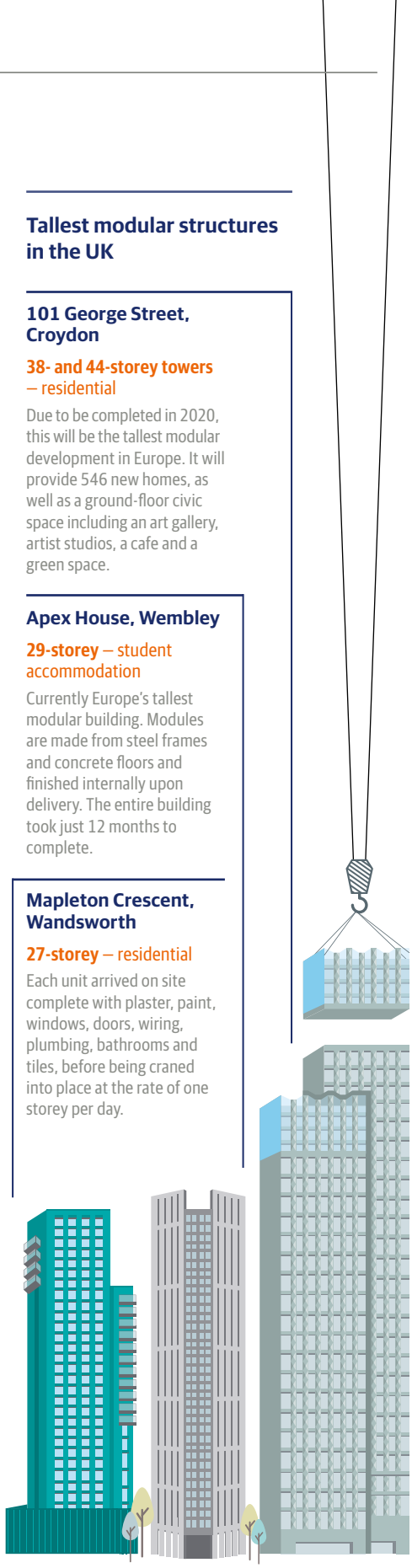


Image: Huf Haus

Huf Haus

Homes built by Huf Haus combine the Bauhaus school of design with the centuries-old German tradition of half-timbered houses – or *Fachwerkhäuser*.

Introduced in the 11th century, *Fachwerk* houses could be built at speed and were well insulated while still allowing for open-plan designs – all now highly desirable traits in today's modular homes.

Just as simply as they can be put together, *Fachwerk* houses can be dismantled and reassembled somewhere else. This has made historical examples much easier to preserve in the face of modern construction.

"Modular need not be an inferior social housing solution."

in England, says two problems remain. He warns: "This is still a fairly new, fledgling industry in England and there is not the level of data available to prove whether these products last the 30, 40 or 50 years that housing associations need. The other key issue is cost – modular housing does not work out any cheaper in the way it is being procured by housing associations at present."

The problem is one of scale. While L&G Modular is part of one of the UK's largest insurance companies and its factory has the capacity to build 3,000 homes annually, production has not reached that level yet. Ilke hopes it will hit 2,000 homes a year in the next couple of years. Besides L&G Modular and Ilke, Berkeley Homes recently announced plans to build 1,000 modular homes out of a factory in Ebbsfleet, Kent. By contrast, Britain's biggest traditional housebuilder, Barratt Developments, built 17,579 homes in 2017. Rival Persimmon delivered another 16,449.

Jeffwitz says efforts are being made to encourage National Housing Federation members to join forces and submit combined orders to create a long, steady order book for modular constructors, helping them realise economies of scale. The government is under pressure to do more to support the industry too.

Modular is unlikely to present a threat to traditional housebuilding in the immediate future, but that could change. Knight Frank's *Housebuilding Report 2018*, which surveyed more than a hundred housebuilders and developers (accounting for almost 75% of houses built in the UK each year), showed nearly nine out of 10 thought modular would boost supply in five years' time, with more than a quarter predicting it would have a "significant impact" by then.

One reason for that may be a skills shortage. According to the Royal Institution of Chartered Surveyors, 62% of surveyors reported that a lack of skilled workers was limiting building activity, something that could be exacerbated due to Brexit if European nationals opt to leave the UK.

Strutt & Parker's Curtis argues that off-site construction requires fewer builders. She says: "The challenges of the UK's housing shortage are much more complex and political than simply finding a quicker way to build homes, but factory-built houses address some of the issues, particularly speed of construction and overcoming the shortage of skilled labour.

"There is clearly an appetite from developers and policymakers to overcome the barriers and introduce more modular housing, and advantages to be passed on to home buyers."

While many of Britain's post-war prefabs lasted longer than anyone might have predicted, as a building method prefabrication quickly died. But times have changed. Technology has moved on; traditional builders are an expensive and reasonably scarce resource. This time, perhaps, the foundations are in place for modular housing to take off.

Commercialising the cosmos

Space was once the exclusive domain of two superpowers. Now it has become perhaps the ultimate competitive arena for two tech giants – not to mention a host of other private enterprises that see untold promise and profits in reaching for the stars. With the entrepreneur-driven commercialisation of space gathering pace, where could a synthesis of the corporate world and the cosmos eventually lead us?

Christopher Buxton

When Stanley Kubrick set about making *2001: A Space Odyssey*, a film now consistently ranked among the greatest of all time, he insisted on surrounding himself with some of the world's leading scientific experts. It was the mid-1960s, and Kubrick, a director renowned for his perfectionism, did not want his uniquely ambitious and expensive movie to be outguessed by the future.

Space exploration was still in its infancy. In March 1965, just weeks after MGM began to tease *2001*'s release, cosmonaut Alexei Leonov became the first person to "walk" in space; NASA's Ed White followed three months later, bettering the Russian's feat by 20 minutes in a typical display of Cold War one-upmanship. Nobody could know for certain what might be achievable in another three and a half decades, but Kubrick wanted to get as close as possible to the likely reality.

Astronaut Dale Gardner spacewalks during a mission aboard *Discovery*, one of NASA's space shuttles.

Image: NASA

His success in this regard is evidenced by one of *2001*'s most memorable sequences, which depicts a passenger-carrying Orion III "spaceplane" docking with an orbiting space station. Famously accompanied by Johann Strauss II's *The Blue Danube*, the scene would in many ways prove uncannily prescient. Sure enough, we now have orbiting space stations; NASA's space shuttles, which flew more than 130 missions between 1981 and 2011, were aircraft-like in design; and the at-seat entertainment systems that are now part and parcel of air travel can trace much of their heritage to the Orion III's interior.

Look more closely, though, and you can see that Kubrick and his advisers presaged yet another development – one whose potentially enormous implications have only recently started to become apparent. With the iconic logo of Pan American Airways embellishing the Orion III's flanks, *2001* correctly prophesied the commercialisation of space – save, that is, for failing to predict that Pan Am would go bust in 1991 and that spaceplanes are now more likely to carry corporate branding linked to Amazon and Tesla.

From Cold War to corporations

On 4 October 1957, to the astonishment and horror of the West, the USSR launched *Sputnik I*, the first-ever artificial satellite. Its radio transmitter's distinctive series of beeps was soon picked up by the US and was sufficient to convince the stunned Americans that their technological superiority, all but undisputed since the end of the Second World War, could no longer be taken for granted.

Sputnik I was barely the size of a beach ball, but the US reasoned that it marked a major step forward in Soviet efforts to develop an orbiting nuclear-strike capability. It was the first telling blow of the original "space race" – an extraterrestrial extension of the Cold War – and it prompted a period of fierce competition fired by political tensions,

Edwin 'Buzz' Aldrin poses with the Stars and Stripes after becoming the second person to set foot on the Moon during NASA's historic *Apollo 11* mission in 1969.

> "Space is now the stellar playground of tech billionaires."

military exigencies and a realisation that the heavens could represent the supreme stage for parading global prestige, scientific pre-eminence and ideological primacy.

The race peaked on 20 July 1969, a year after cinema-goers first experienced *2001*'s vision of things to come, when *Apollo 11* commander Neil Armstrong set foot on the Moon and declared "one giant leap for mankind". Eleven more astronauts, all American, followed him before the enthusiasm and funds necessary for further lunar landings ran out in 1972. A spell of détente brought a US-USSR space rendezvous by 1975, and by the early 1990s, in the wake of the Soviet Union's collapse, any lingering pretence of a race had given way to overt cooperation – as most spectacularly illustrated by the International Space Station.

Today, as the conquest of space enters a radically different era, the Cold War is long forgotten. The US and Russia have joined a dozen other nations in a quest to "expand human presence into the solar system", and the United Nations has opened an Office for Outer Space Affairs. Yet by far the most significant shift is that companies, not countries, are now leading the way.

Two in particular are at the forefront. The first is Blue Origin, established in 2000 by Amazon founder and CEO Jeff Bezos; the second is SpaceX, established in 2002 by Tesla founder and CEO Elon Musk. Space is no longer the exclusive preserve of a select few government agencies: it is the stellar playground of tech billionaires.

The private-public paradigm

"We want a new space race," Musk declared during a speech at Cape Canaveral last year. "Races are exciting." At least to some extent, this is what is taking place; but this "race" is largely defined by friendly competition and is widely regarded as a prospective win-win for all concerned. To quote Professor John Logsdon, who founded the Space Policy Institute at George Washington University and helped NASA investigate the 2003 *Columbia* disaster: "Bezos' style is to do things and then brag about them. Musk's style is to brag about things and then do them."

And they have plenty to brag about already. Blue Origin made history by completing the first-ever landing of a reusable rocket. SpaceX made history by launching the most powerful working rocket ever constructed. Both have rapidly cemented their positions as go-to contractors for NASA and other space agencies, as well as for telecommunications companies that continue to add to the thousands of man-made satellites circling the Earth. Reusable rockets operate at a fraction of the cost of their government-funded counterparts and have quickly come to constitute a reliable business model, allowing Bezos and Musk to muscle in on territory that was for decades dominated by longstanding NASA suppliers such as aerospace giants Boeing and Lockheed Martin.

This suits NASA especially well, says Professor Scott Hubbard, of Stanford

Images: NASA, SpaceX

Space exploration in numbers

3
countries (the US, Russia and China) with successful manned spaceflight programmes

12
men have walked on the Moon

14
national space agenices with a shared vision for "expanding human presence into the solar system"

$60 million
cost of a flight by SpaceX's reusable Falcon 9 rocket

$1 billion
estimated cost of a flight by NASA's planned SLS "super-rocket"

1 billion
Jeff Bezos' annual spend on Blue Origin projects

$1.6 billion
cost of a flight by a NASA space shuttle

$150 billion
cost of the International Space Station, the most expensive construction ever built

University's Department of Aeronautics and Astronautics, because it allows the agency to focus on "exploring the fringe, where there really is no business case". Interviewed last year, Hubbard, a former director of NASA's Ames Research Center, told Space.com: "I see this not only as cooperation or collaboration but maybe even as interdependence."

NASA itself has expressly advocated private-public partnerships. "The private sector wants to move fast and be cost-effective," says Phil McAlister, the agency's director of commercial spaceflight, "and NASA has 50 years of human spaceflight experience. Those two things actually complement each other very effectively."

There is no doubt, though, that Bezos and Musk have their sights set far beyond the cargo contracts that currently fill Blue Origin's and SpaceX's ledgers. They are united in their determination to take people – not just astronauts but ordinary, everyday citizens – deep into space. Their respective corporate mission statements make this abundantly clear: Blue Origin is "committed to building a road to space so our children can build the future", while SpaceX has "the ultimate goal of enabling people to live on other planets".

Richard Branson's Virgin Galactic is pursuing similar objectives. So, too, are the numerous start-ups that are increasingly entering the burgeoning market for commercial space travel. As has been witnessed in other technology-driven sectors, the pie is likely to be divided into ever-thinner pieces – and some of the smallest and most nimble competitors could prove to be among the genuine game-changers.

SpaceX's Dragon 2 craft, shown here preparing for its first orbital test, successfully completed an uncrewed mission to the International Space Station in March this year.

> "Reusable rockets have quickly come to constitute a reliable business model."

Rules, risk and reward

The emergence of a robust and even crowded marketplace, particularly one in which entrepreneurship is a key dynamic, raises a number of difficult questions. Is space the next investment

frontier? Who controls space? Who *owns* space? As leading British space scientist Professor Monica Grady has observed: "Once investment starts to flow, lawyers won't be far behind."

The UN's Office for Outer Space Affairs now oversees the Outer Space Treaty, a framework for the governance of space. By the standards of UN conventions, which are seldom succinct, the treaty has surprisingly few articles. The document was originally drawn up in 1967 – a year before *2001* made its debut and two years before the world watched in awe as Armstrong descended the ladder of *Apollo 11*'s lunar lander – and the text was formulated for nation states rather than for private enterprises.

It asserts, for example, that no country can lay claim to any celestial body. Yet companies are already assessing the feasibility of "space mining" and extracting water from the Moon and other natural satellites, not least because it has been estimated that using hydrogen as rocket fuel could reduce the cost of spaceflight by up to 95%. This is not a matter of curbing jingoistic flag-planting: it is a matter of containing the full might of market forces in an environment of unprecedented unfamiliarity.

Moreover, such forces are customarily rooted in the concept of risk and reward – and the risks in space are considerable. In the words of Grady, a professor of planetary and space science at the Open University: "If we look at the way more conventional businesses operate, such as supermarkets, competition drives prices down. There is little reason to believe that competition between space companies would follow a different model... in which case greater risks might be taken in order to increase profitability. As the field develops and additional private companies move into space exploration, there will be a higher probability of accident or emergency."

> "It is a matter of containing the full might of market forces in an environment of unprecedented unfamiliarity."

The military dimension

Late last year, at a meeting of the National Space Council, US Vice-President Mike Pence outlined plans for a new branch of the military. The Space Force, he announced, would be an "elite group of fighters specialising in the domain of space".

Such a notion appears at odds with the spirit of peace and cooperation that has come to characterise space exploration. Yet the truth is that the heavens have always been viewed as an important sphere of military operations – as was first illustrated by *Sputnik I*, which was immediately interpreted by the US as a portent of the USSR perfecting orbiting nuclear weapons.

It has been estimated that 95% of today's man-made satellites serve both a civilian use and a military use. As Professor John Logsdon, the founder of George Washington University's Space Policy Institute, has remarked: "Space has from the start been militarised – but so far not overtly weaponised. There is a somewhat fuzzy line that has not yet been crossed."

The Outer Space Treaty leaves worrying room for manoeuvre in this regard. For example, it prohibits orbiting weapons of mass destruction, but it neither mentions weapons that do not fully achieve orbit nor defines precisely what "mass destruction" means.

Logsdon strikes a note of pessimistic pragmatism. "There is a school of thought that says that continuing to treat space as a sanctuary free from armed conflict is kind of a fool's errand, that every other arena for human activity – land, sea, air – has been weaponised and that the idea that you can indefinitely keep space from being weaponised is naive."

US Vice-President Mike Pence outlines plans for a new Space Force during a speech last year.

Logsdon has sounded a similar warning. He fears a substantial gap between the standards adhered to by the likes of NASA and those applied by the private sector's would-be purveyors of commercial space travel. As the super-rich jostle to journey to the stars, he says, we could soon discover whether "somebody with enough money to take a joyride around the Moon cares about NASA's human safety requirements".

Perhaps conscious of such concerns, Bezos, for one, is trying to shift the narrative. In recent months he has repeatedly denied the very thing that Musk has demanded. "We are not in a race," insists the welcome message on Blue Origin's website. "There will be many players in this human endeavour to go to space to benefit Earth. We will go about this step by step, because it is an illusion that skipping steps gets us there faster." Does he mean it? The truth, as with so much else in this new era of space exploration, is very much up in the air.

Image: Erik S Lesser/EPA-EFE/REX/Shutterstock

Urban mining

There is more gold in a single iPhone 4 than in a kilogram of the highest-grade gold ore. Extracting rare elements from disused consumer electronics has become a profitable business and is seen by many as environmentally friendly, but the reality of urban mining is complex.

David Shepherd

A worker recycles e-waste at a specialist plant in the slums of Nairobi, Kenya.

Image: Thomas Mukoya/Reuters

If you are one of the two and a half billion smartphone owners around the world, you have a gold mine in your pocket. You probably also have an unusual concentration of palladium, aluminium and copper. And it is not just phones that contain precious metals. So do televisions, microwaves and other electrical products with chips and circuitry.

Extracting these elements can be incredibly cost-efficient compared with traditional mining methods. A joint study published last year by Sydney's Macquarie University and Beijing's Tsinghua University showed mining from ore was 13 times more expensive than "mining" electronic waste – also known as e-waste mining or urban mining.

There is no shortage in the supply of unwanted gadgets for dismantling. In 2016 alone 435,000 tonnes of phones, containing as much as £8.3 billion worth of raw materials, were discarded. UN research has estimated that the world is on track to produce a total of 52 million tonnes of e-waste a year by 2021.

The Thomson Reuters GFMS Gold Survey suggests more than three quarters of the world's economically viable gold reserves have already been extracted. So there is a growing need to recycle these precious materials – and a growing commercial opportunity.

The darker side of urban mining

On the face of it, urban mining would appear to have the makings of a modern, sustainable industry. The concept is creeping into the mainstream: every winner's medal at the Tokyo 2020 Olympic and Paralympic Games will be made from recycled metal collected from the Japanese public and businesses.

> "The world is on track to produce 52 million tonnes of e-waste a year by 2021."

From top: A worker sorts through computer keyboards amid a pile of e-waste at a facility in China. Apple is hoping that AI-driven automation, such as this device for taking apart iPhones, can make e-waste recycling safer.

But this eco-friendly image is in stark contrast to the conditions in which most urban mining currently takes place. Until recently China accepted 70% of the world's e-waste and Guiyu, a town in Guangdong province, was the world's urban mining capital.

The legitimate importing (and illegitimate smuggling) of millions of tonnes of discarded electronics into the town had driven a boom in the business of extracting rare materials from them. Without any regulations to protect workers, however, the results were catastrophic. Electronic devices may be a rich source of precious metals, but they also comprise toxic heavy metals like lead, mercury, cadmium and beryllium, polluting PVC plastic and hazardous chemicals.

A Greenpeace report on Guiyu found children climbing towers of waste and people working with open-top acid baths, unprotected, stripping electronics down to their metal components. Some 5,000 families were estimated to work in unregulated e-mining workshops. In an interview with the *South China Morning Post*, a former local worker said: "The whole town was blanketed by foul air that smelled of acid. I always felt like coughing."

Two separate studies led by Shantou University Medical College found that a large majority of children assessed had unsafe levels of lead in their blood, which can hinder the development of the nervous system and IQ. Other reports have found a high incidence of skin damage, headaches, vertigo, nausea, chronic gastritis and stomach

Images: Jim Xu/Contributor/Getty Images, Apple

ulcers, as well as dangerously high concentrations of toxic flame retardants in workers' bodies.

As a result of international condemnation, the Chinese government announced it would significantly reduce imports, banning 24 kinds of solid waste. The Guangdong provincial government made efforts to clean up Guiyu, building a 1.5 billion yuan (£170 million) industrial park isolated on the outskirts of the city to replace the individual workshops that once polluted its residential areas.

Better for China, better for Guangdong; but now the problem has been displaced to Southeast Asia. Today governments in countries like Vietnam and Thailand are also looking to curb imports.

Brighter future

Governments now motivated to find solutions are considering compelling manufacturers to take greater responsibility for products over their whole lifetime, right through to disposal. This would encourage them to design electronics that are more easily recyclable. Last year Apple unveiled a prototype iPhone recycling robot named Daisy, an AI-driven machine that can take apart up to 200 iPhones in an hour.

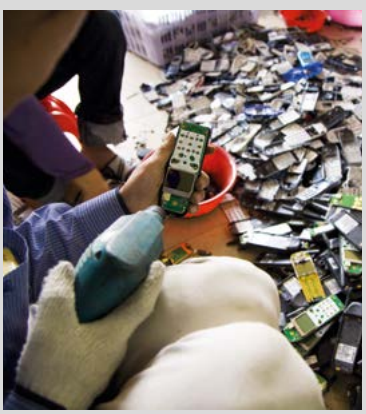
By reducing e-waste, encouraging repair rather than upgrade would also help. Several phone manufacturers have already attempted to build modular phones that allow consumers to change individual parts. So far these models have failed because they are bigger, less elegant and more expensive, which makes them unlikely to appeal to consumers.

"Urban mining would appear to have the makings of a modern, sustainable industry."

iPhone v traditional mining for gold

iPhone 4	Fosterville Mine*
0.034g per 137g (1 iPhone)	**21.5g** per tonne of ore (1,000,000g)
0.248g per 1,000g	**0.0215g** per 1,000g

* Australia



The US Environmental Protection Agency says: "One metric tonne of circuit boards can contain 40 to 800 times the amount of gold and 30 to 40 times the amount of copper mined from one metric tonne of ore in the United States."

Academics are also addressing the problem. At Stanford University, chemical engineers are developing the first fully biodegradable electronic circuit using natural dyes that dissolve in acid with a pH a hundred times weaker than vinegar.

Meanwhile, Professor Veena Sahajwalla and her team at the University of New South Wales have designed an e-waste recycling micro-factory. The facility extracts useful products by burning e-waste in miniature furnaces at temperatures calibrated for the desired metal, before passing the remains along a production line where robots pick out valuables. The process also turns plastic and glass waste into silicon carbide nanoparticles, which are used in a variety of industrial settings.

The whole production line is compact, so it can be used by communities or incorporated by businesses into their existing manufacturing process. Professor Sahajwalla says that one micro-factory would be capable of paying for itself in just two to three years.

This is a problem for which there is no simple solution, but governments, manufacturers and scientists the world over are working on it. With so much value in e-waste, there is genuine hope that urban mining could eventually become a paragon of 21st-century sustainability.

The end of meat?

A growing number of us are reducing our meat and dairy consumption. What are the alternatives and can we really save the planet by abandoning animal protein?

Perry Rudd

Image: Jon Lovette/Alamy

At the Lao Café, Covent Garden, diners are tempted with an unusual side dish from Thailand: *malang tod* – seasonal insects fried with herbs.

The "bug" is catching across the capital's restaurant scene, with avocado topped with grasshoppers at London Bridge's Santo Redemio Mexican restaurant, crunchy fried pupae in a salad at the Greyhound Cafe in Fitzrovia or fudge topped with wood ants at London Bridge's Native.

"Crickets contain similar levels of protein per kilo to beef."

In November Sainsbury's became the first UK supermarket to stock edible bugs when it began selling Eat Grub's Smoky BBQ Crunchy Roasted Crickets.

Insects may be novel as a food form in most of Western Europe, but this is not the case in many other parts of the world. It is estimated that approximately two billion people around the globe already include insects in their diet and that there are over 1,900 edible species.

Termites taste like mint (apparently). Sago grubs – eaten across Southeast Asia – and tree worms have a bacon flavour. Stink bugs remind people of apples. Red agave worms are spicy. And Australian sugar-ant abdomens taste of sherbet. It is a whole new world of flavours.

The appeal of this food form is obvious, at least in a couple of respects. Insects have high protein. Crickets, for example, contain similar levels of protein per kilo to beef. Some species of Venezuelan termite are as much as 64% protein by weight.

Insects are also rich in essential amino acids and omega-3 fatty acids. Some are also very high in iron: mopane caterpillars, found in Africa, contain 310g per kilo, around five times more per kilo than beef.

Because they are cold-blooded, insects require less energy to maintain their internal body temperature. This means that, unlike cattle, they are efficient at converting feed into edible body mass. Crickets require around 2kg of feed to produce 1kg of meat, around 80% of which is edible. Cattle require four times as much feed and only 40% of the animal can be consumed. Insect diets can also include animal waste and plants that are inedible to humans. On top of all this, they have much shorter life cycles, so they can be reproduced much more quickly.

In short, they are a much more efficient way to generate valuable proteins for a growing global population – and much less harmful to the planet.

What's wrong with meat?

The problem with cows is rather embarrassing. They are prone to flatulence. They also burp a lot. In fact, some researchers estimate the average cow burps 600 litres of methane a day. Added to what is coming out of the other end, this means that cows may emit as much as 750 litres of methane a day. Scientists in California have discovered that mixing seaweed in their diet can help reduce that figure, but this is no large-scale solution.

There are 1.5 billion cows in the world, most bred and raised for the meat industry. According to the UN's Food and Agriculture Organisation (FAO), they are responsible for nearly 15% of all anthropogenic greenhouse gas emissions – in other words, those caused by human activities.

Meat and dairy are responsible for a disproportionate amount of agricultural emissions, 60%, despite producing just 18% of the world's calories. Livestock farming takes up 70% of agricultural land

use. Many argue that much of that land would be better used growing crops, if only the world would turn vegan.

Heated debate

As the problem of global warming looms larger, the question of diet becomes more intense. Global temperatures are on average 0.8°C higher than they were in the pre-industrial period. That may not sound much, but at current levels of emissions we are on track to hit 3°C in just 80 years.

The UN Paris Agreement on greenhouse gas emissions pledged to keep the figure "well below" 2°C, but even limiting it to 1.5°C would still make the planet warmer than it has ever been in human history.

The consequences of global warming are well known: dead coral reefs, ocean acidification, droughts, water shortages, poorer crop yields and greater risk of extreme weather events like hurricanes and wildfires.

Last year *Science* reported research from scientists behind the most comprehensive analysis to date of the damaging impacts of farming. They claimed that avoiding meat and dairy products was the single biggest thing an individual could do to help reduce environmental harm – far more effective even than reducing air travel or buying an electric car.

A study led by Oxford University's Joseph Poore found that cutting out meat and dairy products reduces an individual's carbon footprint from food by up to 73% and would reduce the global amount of land used for farming by 75%.

Such is the efficiency of a vegan diet that a separate report suggested that Britain would need only three million hectares of the 17 million it currently uses to be completely self-sustaining.

Little wonder, then, that veganism is winning so many converts. One study found that there are now 3.5 million vegans in the UK. One in eight Britons is now vegetarian or vegan. Many more are reducing meat in their diets. One in five is now flexitarian, eating a predominantly vegetarian diet with the occasional inclusion of meat.

Alongside this trend has been the rapid growth of meat substitutes. Sales of Quorn, which is made from a protein derived from a microfungus, rose 12% in the first half of 2018.

Companies such as Impossible Foods and Beyond Meat have managed to replicate the taste and even the appearance of beef with plant-based products, inspiring several of the UK's leading supermarkets to launch "bleeding" vegan burgers.

Going even further in the quest to replicate the real thing is lab-grown meat. By creating muscle tissue from a stem-cell sample, it is possible to "grow" a steak. In the concept's infancy the costs were astronomical – a single beefburger was priced at £192,000 – but they have fallen since, and the industry is attracting significant venture capital investment.

> "One study found that there are now 3.5 million vegans in the UK."

Impossible Foods' Impossible Burger is one of several new plant-based products that claim to recreate both the taste and the appearance of beef.

Challenges

Meat and dairy alternatives are not without issues. The growing popularity of soya is leading to deforestation in Brazil and other countries. Eco-sensitive consumers have to check packaging to ensure that soya ingredients have been sourced sustainably.

Almond milk, a popular substitute for cow's milk, has come under the spotlight for requiring large quantities of water when it is mostly produced in drought-prone California. And scientists have questioned whether the electricity used to create lab-grown meat will make it more environmentally harmful than the real thing.

Others challenge the rationale for removing livestock from the food chain. Farmers and conservationists Isabella Tree and Charlie Burrell turned their conventional farm on Knepp Estate in West Sussex into a 1,400-hectare rewilding project where English longhorn cattle, Tamworth pigs, ponies and deer now roam freely. Doing so has dramatically improved biodiversity and has been enormously beneficial for the estate's topsoil.

Tree and Burrell draw attention to FAO reports that estimate that 25 billion to 40 billion tonnes of topsoil is lost to erosion each year and that the only way to reverse the process is to let arable land lie fallow and return it to grazed pasture for a period, as farmers used to before artificial fertilisers and mechanisation made continuous intensive cropping possible.

The solution to sustainably meeting the world's dietary needs is obviously complex. What is clear is that if we are to meet climate-change commitments then we need to eat less meat. It may be some time before insects become a mainstream ingredient in Britain, but the rise of palatable meat alternatives is making the transition towards a more plant-based diet much easier for many carnivores.

Image: Impossible Foods

Image: Ashley Cooper pics/Alamy

Why sustainable investing is here to stay

Consumers, companies and investors alike are increasingly recognising that environmental, social and governance considerations are becoming vital to businesses' long-term success. The benefits for wider society are also likely to be far-reaching.

Jane Sydenham

There has been an increasing amount of chatter in the press about sustainable and socially responsible investing (SRI) over the past few years. Just as today's shoppers want to consume more sustainably, today's investors are starting to recognise that better corporate practices are likely to enhance a company's long-term competitive advantage.

After all, greater transparency and improved corporate behaviour make companies better to work for and shop at. It makes sense that this should ultimately translate into better returns.

SRI assets across the world's five biggest regional markets stood at $30.7 trillion at the beginning of 2018. This represents a 34% increase in just two years.

Earlier this year the Morgan Stanley Institute for Sustainable Investing reported that $12 trillion – a quarter of US assets under management – is invested in line with environmental, social and governance (ESG) factors.

"Greater transparency and improved corporate behaviour should ultimately translate into better returns."

The UN-backed Principles for Responsible Investment (PRI) are driving the same cause. The PRI promotes ESG factors when analysing returns and managing risk, and its influence is rapidly growing. It currently has over 2,300 signatories worldwide, representing roughly $80 trillion of invested assets.

Opportunities lighting up

Many investors sleep better in the knowledge that their money is being spent ethically. Yet there are also financial incentives behind sustainable investment.

Towards the end of last year *Forbes* reported that the cost of developing renewable energy generators across the US had fallen below that of maintaining existing coal-fired plants (the cost of solar is said to have fallen 88% since 2009). This milestone heralded considerable savings for consumers and marked the start of a fundamental shift from traditional to sustainable energy in the US market.

The same *Forbes* article explained that some US energy providers were planning to retire a significant percentage of their coal capacity ahead of schedule, in favour of lower-cost solar and wind facilities. One major utility, MidAmerican, announced it would be the first to offer 100% renewable energy by 2020 without raising consumer tariffs. Investment opportunities are lighting up as the commercial benefits of low-cost renewables become clear.

Demolishing costs

Some sectors are investing in sustainable technologies to drive down costs. The construction industry is becoming more sustainable as it realises that increased energy efficiency reduces operational expenses.

A more sustainable approach is also changing the market and pricing

"Those companies taking the ESG route may be making a better name for themselves than their less sustainable peers."

As demonstrated by its use of electric vehicles, UPS is one of many multinational companies taking steps towards reducing their carbon footprint.

strategies of global supply chains, where low-cost procurement is beginning to align more with ESG. For example, freight carriers like UPS are switching their fleets to cheaper, renewable fuels – a move that reduces the cost of global logistics, cuts harmful emissions and offers long-term savings for consumers.

Making a splash

Reputation plays an important role, too. Those companies taking the ESG route may be making a better name for themselves than their less sustainable peers, ultimately leading to better financial performance.

Global water technology company Xylem has become a market leader in water risk management through its development of innovative "smart water" technologies. These improve the quality and quantity of water, as well as the efficiency of wastewater management. Most importantly, understanding the non-financial benefits that smart water brings to communities is a fundamental part of the business and one that is doing Xylem's reputation litres of good.

Dam-age

Businesses are increasingly aware of the potential financial and reputational damage of serious ESG failures. The deadly dam collapse in the Brazilian mining town of Brumadinho was the second fatal disaster in four years to hit Vale SA, the world's biggest iron ore producer, and saw the company's market value drop by $18 billion. In March this year Vale's CFO reported that its 2019 iron ore sales forecast could be reduced by as much as 75 million tonnes.

A catastrophic dam collapse in the mining town of Brumadinho, Brazil, damaged the reputation and profits of Vale SA, the world's biggest producer of iron ore.

> "Investors also benefit from a more responsible approach, safe in the knowledge that their money is not driving unethical businesses and practices."

There are plenty of other examples of poor corporate practice damaging results. Revelations about abusive working conditions at Sports Direct not only had a negative impact on the company's share price but also posed searching questions about the retailer's business model and labour policies. Sports Direct subsequently offered zero-hour contractors guaranteed hours, gave its workforce a meaningful voice at boardroom level and dropped its controversial "six strikes" dismissal policy, which punished employees for alleged offences such as "excessive talking".

Sustained sustainability

It should now be clear what the press has been chattering about. Better corporate governance drives better corporate practice and a better reputation, ultimately improving long-term financial performance. Investors also benefit from a more responsible approach to consumerism, safe in the knowledge that their money is not driving unethical businesses and practices.

It therefore seems reasonable to assert that companies with strong ESG practices are likely to prosper over the long term. We think that sustainable investment is here to stay.

Images: UPS, Washington Alves/Reuters

Intergenerational wealth planning

As the old saying goes, the only things certain in life are death and taxes. To rub salt into the wound, there is a system in place that taxes us even further in death. Welcome to the thorny issue of inheritance tax.

Conor O'Sullivan

Inheritance tax (IHT) can be simply described as a tax that applies to anything you leave behind above £325,000. The current rate is 40% and covers any savings, property, investments, insurance pay-outs and even vehicles that make up your estate.

It is a controversial tax, because it effectively means that your loved ones will get less than two thirds of whatever you leave them above the £325,000 threshold. And this, remember, is from an estate made up of things that you have already paid tax on during your lifetime.

Last year the government pocketed £5.4 billion through IHT[1]. Thanks to years of rocketing house prices, this figure looks set to reach almost £7 billion by 2024[2] as homeowners with otherwise modest estates are unwittingly caught above the threshold.

But what if I told you that IHT is a tax that is essentially optional? This is true. In fact, with some forward planning, there are many legal ways to avoid it.

Work out what you are worth

Few of us want to focus our energy on what happens to our wealth when we die, but ignoring it can be a costly mistake. As I mentioned earlier, death is one of the few unavoidable things in life. Your assets will inevitably pass to someone when you go.

The first thing to do is familiarise yourself with the current rules. We know that the first £325,000 of an estate is exempt from IHT – or, to use Treasury-speak, falls into the nil-rate tax band.

What you may not know is that your tax-free limit increases by a further £150,000 if your estate is worth less than £2 million and includes your main residence. This takes the total tax-free amount you can leave behind to £475,000.

The icing on the cake is that this is an individual allowance, so married couples and those in civil partnerships can leave up to £950,000 before IHT is payable.

Make a plan

Remember that anything in your estate above the nil-rate band will be taxed at 40%, so your next move should be to work out how much more there is. Only then can you figure out the best way to use it now so that it is not taxed later.

The very first step is to ensure that you have a valid will in place to ensure that your wishes are known. We then need to look at how we can reduce the IHT bill!

Image: Halfpoint/iStock

Happily, you have a number of options:

1. Spend it

Money should be spent! You are either spending it now or saving it to spend at a later date. As you have already paid income tax on it, why leave it behind only for it to be taxed again?

The only thing that you need to be sure of is that you have enough money to last your lifetime. This kind of future-proofing is where guidance from a financial planner can be worth its weight in gold.

2. Be generous

Why wait until you die to give your kids their inheritance? This is a common sentiment among baby-boomers, who are increasingly acting as the Bank of Mum and Dad.

Unfortunately, gifting your money while you are alive is a bit more complicated than it sounds. It is therefore a good idea to get professional advice.

As a rough guide, here are some means of avoiding IHT:

- Give away £3,000 worth of gifts a year.
- Give unlimited gifts of less than £250 (but not to the same person you gave £3,000 to). You could make everyone's birthday more fun!
- Be generous with wedding gifts. You can hand your child £5,000 and your grandchild (or great-grandchild) £2,500 to mark their big day. The limit for wedding gifts for any other relatives or friends is £1,000.
- Help a former spouse, an elderly dependent or a child under 18 in full-time education with living costs.
- Give gifts from your income rather than from your savings. IHT is payable

on your assets, so gifts made directly from a salary – or a pension – are exempt if they are regular payments.

- Pay your grandchildren's school fees.

Anything outside these exemptions would be classed as either a Potentially Exempt Transfer (PET) or a Chargeable Lifetime Transfer (CLT) and could still be counted as part of your estate if you die within seven years of making the gift. So choose wisely in your benevolence if you are looking to reduce the overall IHT bill.

In particular, a CLT would have an immediate charge of 20% on the value of the gift. So, while gifting the money away seems logical, there are many landmines to avoid – and professional guidance should be considered.

3. Donate to charity

Anything you gift to a charity, museum, university or community (amateur) sports club is exempt from tax. Gifts to political parties are tax-free if the party meets certain conditions. Again, choose wisely.

4. Gift your pension

Thanks to "pensions freedom" rules introduced in 2015, any money in a pension fund that has not been used to purchase an annuity can be left to the next generation – free from IHT.

There is, however, a chance that your beneficiaries will have to pay income tax on it. In addition, it does not apply to final-salary pensions.

5. Life insurance

This does not reduce IHT, but it can be a good way to pay for it. As long as you work with an adviser to figure out your likely IHT bill while you are still alive, you can find an insurance policy that will pay out the sum to cover it upon your death.

> "IHT is a tax that is essentially optional. In fact, with some forward planning, there are many legal ways to avoid it."

It is crucial, though, that the policy is placed in trust to avoid the pay-out being added to the estate and itself made liable for IHT.

6. Trusts

This is a slightly more complex way of gifting your assets. You set up a trust detailing how much you want to give away, whom you are giving it to and when they are to receive it (i.e. at a certain age or upon your death).

As the trustee, you can also place restrictions on what the money can be used for. This allows for a little more control over the money rather than if it was gifted outright. Be warned, though: you cannot use the trust for yourself.

The complexities of trusts demand an article of their own, so all I will say for now is that professional advice is vital if you are tempted to take this route.

7. Use Business Relief

Business Relief is designed so that family businesses can pass through the generations without being ravaged by IHT. Not many people realise that it also extends to unquoted shares.

This effectively means that it is possible to have an investment that, as long as certain conditions are met (e.g. the investment must be held for a minimum period of two years), will not count as part of your estate and will therefore avoid IHT.

This is a route that is growing in popularity, as it allows you to retain access to and control of the money for your own benefit rather than giving it away. However, as the conditions are quite specific, it is an area where professional guidance is necessary.

Summary

As you can see, there are many ways to avoid – or at least reduce – the burden of IHT. It is important to note, though, that few are straightforward and all require a degree of financial planning. For most of us there is no one-size-fits-all approach, so working with a knowledgeable financial adviser is likely to be the best way to make the most of the above strategies.

Finally, remember that estate planning is not just about preparing the money for the kids: it also about preparing the kids for the money. Involving them in a conversation about their inheritance is the best way to make sure your wealth passes between the generations in the most efficient and effective way possible.

Conor O'Sullivan is an Area Director with Vision IFP. With 15 years of industry experience, including a decade with HSBC, he joined the company to continue in a leadership capacity while still serving as a genuinely independent financial planner. Based in the Midlands, he is a Chartered Financial Planner and a Fellow of the Personal Finance Society. He has covered all aspects of personal and commercial financial planning during his career.

Sources:

1 HMRC Tax & NIC Receipts, Apr 2019
2 HM Treasury Budget Autumn 2018

Q&A

Stephen Elvin *IFA and Director*
Stephen Elvin Independent Financial Advice Ltd

Stephen Elvin

Born: Bristol

Lives: Burnham on Sea

Professional qualifications: DipPFS

First job after school: Interior Design store!

Hobbies: Drumming, writing music, running, live music, diving abroad.

Married, kids etc: Married with my first-born Ivy who is 9 months old and I totally adore!

How long have you been an adviser?

5 years (15 years in finance)

How have things altered since you first became an adviser?

So much has changed, from working in the biggest international bank in a restricted advice capacity, to now practicing whole of market independent advice and building my own firm with the support of Vision.

What have been your career highlights so far?

Starting my own firm and making the decision to become self-employed, working for my clients directly. Flying to New York for a work conference.

What service do you feel you offer clients?

I feel I have set up my business to offer a relaxed but professional service, across all the various advice areas. This is so I can look after everything financial for my client and support the wider needs of their families too. The purpose being to give them peace of mind and also take the worry out of decision making and planning for the here and now, as well as the future.

What do you do after work?

Usually an hour walk with Ivy my daughter and Laura my wife to stretch our legs; I love my job, but the downside is its very sedentary and Laura's is too! Plus it gives us chance to catch up and enjoy some time together out of the house (while the weather is good!).

What is your typical day like?

I love to get up early at 6:15am, pick up some financials / news updates from overseas. Then I go out for a 6.50 mile run at 6:45am with my running buddy Claire. Then get back have breakfast with the girls and then onto the computer for 8:45am for work on cases, reports, reviewing clients' portfolios etc. If I have meetings, I always tend to book 10am onwards so it gives me commute time and avoids wasting time in the car in traffic. When I'm out for meetings this tends to take up most of the day.

What would you like to change in the financial services arena?

I feel there is still far too much paperwork and unnecessary replication of information for clients. Although regulation is great and protects them, it can also detract and make it harder for clients to understand. Reducing this would be great for the environment too.

Image: artproem/iStock

Navigating the lifetime mortgage market

The lifetime mortgage market has changed dramatically in recent years. There are now many more products that offer greater flexibility, particularly with regard to accessing money and making payments. Here we highlight some of the options, explain how they are used and take a look at the principal pros and cons of each.

Ben Leach

There are now many different types of lifetime mortgage plan being used for many different reasons. With such a variety of options available, it has never been more important to seek financial advice and find the right solution to suit an individual's specific needs.

A standard lifetime mortgage is a loan secured against your home. It provides you with a tax-free cash lump sum and no required monthly repayments. As with all types of lifetime mortgage, you retain 100% home ownership.

Compound interest is added throughout your lifetime. Once the last deed-holder passes away or enters long-term care, the loan – plus interest – is repaid through the sale of your home. You can typically release 18-50% of your home's value, depending on your age and health.

All lifetime mortgages approved by the Equity Release Council come with a no-negative-equity guarantee, which means you will never owe more than the value of your property.

Advantages of a standard lifetime mortgage scheme

- There are no required monthly repayments.
- You can spend the entire amount immediately if needed.

Disadvantages of a standard lifetime mortgage scheme

- Interest can build up quickly.
- You pay interest on the whole sum immediately, regardless of whether you use it straight away or not.

A drawdown lifetime mortgage works in the same way as a standard lifetime mortgage but offers extra flexibility. It allows you to withdraw money as and when required. You can choose to receive regular payments or release funds on an ad hoc basis, subject to the lender's terms and conditions.

Advantages of a drawdown lifetime mortgage scheme

- Interest grows at a much slower rate if you draw the money over a longer period.
- The money remains tax-free, even if you take out smaller sums.

Disadvantages of a drawdown lifetime mortgage scheme

- The interest rate is only fixed on the initial lump sum, and the amount you draw down is charged at whatever the interest rate is at the time.

An interest-only lifetime mortgage allows you to make monthly interest repayments, which helps keep down the overall cost of a loan. You can fix the interest rate for the life of the loan.

Advantages of an interest-only lifetime mortgage scheme

- The overall cost of the loan is lower.
- You will know how much of your home's value will be left to your beneficiaries.

Disadvantages of an interest-only lifetime mortgage scheme

- You must have sufficient income to maintain regular interest repayments.
- If you choose a variable interest rate then the repayments will become more expensive if rates rise.

An interest-only flexible lifetime mortgage offers complete repayment flexibility. If you want to make regular repayments each month then you can make full or part payment towards the interest. If you decide that you no longer want to make repayments then the product switches to a regular lifetime mortgage, with the interest rolled up instead.

Advantages of an interest-only flexible lifetime mortgage scheme

- You can change your repayment options to suit your circumstances.
- You can reduce or cease your repayments if your income falls.

Disadvantages of an interest-only flexible lifetime mortgage scheme

- There may be additional administration costs involved in switching to a standard lifetime mortgage.

An enhanced lifetime mortgage is designed for those with poor health or certain medical conditions. It enables you to release more money compared to a standard lifetime mortgage. You may qualify for an enhanced plan if you have health problems such as diabetes or high blood pressure or if you are a smoker.

Advantages of an enhanced lifetime mortgage scheme

- You can release more money than a standard scheme would allow.
- You could qualify based on past or present ill health.

Disadvantages of an enhanced lifetime mortgage scheme

- By borrowing more, you will further reduce the value of your estate.
- The interest may grow quickly if you live longer than expected.

A protected lifetime mortgage allows you to guarantee a future inheritance for your beneficiaries by protecting a percentage of the value of your property. However, by ring-fencing some of the value of your home, you reduce the amount of equity available and therefore reduce the amount you can borrow. If you ring-fence 20%, for example, your loan will typically fall by the same percentage.

Advantages of a protected lifetime mortgage scheme

- You have peace of mind that your beneficiaries will receive an inheritance in the future.

"With such a variety of options available, it has never been more important to find the right solution to suit an individual's specific needs."

Disadvantages of a protected lifetime mortgage scheme

- The amount you can borrow is lower, as the equity in your property is reduced.

A home reversion plan is now much less common than a lifetime mortgage. With a home reversion plan, you sell all or part of your home in exchange for a tax-free cash lump sum or a regular income, with the right to stay in your home – rent-free – for as long as you choose.

Your house is sold when you pass away or enter long-term care, with the reversion company taking its share of the proceeds. The company gets all of the proceeds if you sold the whole property; if you sold only a percentage then the company receives this, with the remainder going to your beneficiaries.

Image: sqback/iStock

Advantages of a home reversion plan

- You can take the money as a lump sum or regular payments – or as a mixture of both.
- You can protect some of the value of your home to pass to your beneficiaries.

Disadvantages of a home reversion plan

- You will receive significantly less than the market value for your property – usually 20-60% of its true value.
- Such a plan offers poor value if you die shortly after taking one out.

It is now increasingly common to arrange a lifetime mortgage to repay a standard interest-only mortgage when a bank is requesting its money back and a borrower has no other way to repay.

The interest-only option now on offer allows a borrower to borrow enough money to repay the original loan, with no affordability checks. This is due to the fact that the borrower has the ability to revert to a standard lifetime mortgage at any time and not make payments in the event of no longer being able to afford to do so. In addition, borrowers are using this product to purchase a new home when a standard mortgage is no longer possible due to age or affordability restrictions.

Borrowers are also using lifetime mortgages to enhance their lifestyles. They might, for example, use them to pay for holidays or home improvements or as additional income.

They are also using them to gift money to children and grandchildren, often to assist them in putting down deposits for their own homes. With house prices so high and affordability with lenders so tight, this can be invaluable in helping first-time buyers on to the first rung of the property ladder.

As there are now so many products available, it is essential that you speak to a specialist. This should greatly enhance the likelihood of identifying an option that suits your individual circumstances.

Planning on a long life?

As a nation, we are living longer than ever. This is a cause for celebration, but it also means planning ahead for care in later life has never been more important.

Emma Watson

Increased life expectancy has been one of the great successes of the modern age. In 1901 in England and Wales men lived, on average, to 48 and women to 52. Since then, universal healthcare, medical advances and lifestyle changes have all contributed to longer lives. Today, on average in the UK, a 65-year-old man can expect another 19 years of life, while a woman of the same age can expect to live for a further 21 years.

However, this huge leap forward in longevity is also presenting challenges for individuals, families and society as a whole. As the number of older people is increasing, so is the number who are disabled, living with a long-term illness or in need of care for another reason. Whether that care is delivered in their own home or in a care home, how it is paid for has become a key issue for today.

An estimated 40% of people over 65 have a "limiting" longstanding illness, with dementia one of the main causes of disability in later life. The Institute and Faculty of Actuaries estimates that one in three women and one in four men will have long-term care needs.

Around 15% of people aged over 85 in the UK live in a care home, according to Age UK. Under the current rules, in England and Northern Ireland, people with assets over £23,250 – including property – do not qualify for local authority help and will probably have to meet care home fees in full. In Scotland the threshold is slightly higher at £28,000, while in Wales it is £50,000.

Paying for care yourself is known as self-funding. Given the level of the threshold for local authority help with costs, it should be no surprise that, according to consumer organisation Which?, close to half of those in residential care in the UK are fully self-funding.

The costs of care are considerable. According to the charity Independent Age, older people will, on average, stay in a residential care home for two and a half years, at a cost of £32,000 per individual for the first year, with costs increasing over time and coming to a total of £82,000 over the full 30 months. Which?, however, puts the cost substantially higher, at £116,000.

There are significant regional variations in costs throughout the UK. One recent study found the lowest average weekly costs for residential care to be in Northern Ireland, starting at £519 and rising to £692 for a home offering nursing care for someone with dementia. At the other end of the spectrum, in London the corresponding figures are £721 and £954.

While self-funding does not come cheap, it can be manageable and, with

Image: Sue Robinson/Shutterstock

"While self-funding does not come cheap, it can be manageable and, with appropriate financial planning, need not be a source of anxiety."

appropriate financial planning, need not be a source of anxiety.

With the right advice and guidance, you can put in place a strategy to prepare for these costs, while ensuring you strike the right balance with other aspirations, such as passing on wealth efficiently and enjoying life in retirement.

Run for your life

Though longevity brings its challenges, it is also delivering rewards too. The charity parkrun UK, which organises free weekly 5km timed runs at locations around the UK, says people over 65 clocked up more than 250,000 runs at its events in 2018 — overtaking the 18-24 age group for the first time in the organisation's 14-year history.

If you add the 55-64 age band, the older generation completed a million runs — twice as many as two years ago. NHS experts say there is strong evidence that people who are active have a lower risk of heart disease, strokes, type 2 diabetes, some cancers, depression and dementia.

Meanwhile, a study by the Centre for Ageing Better found that life satisfaction peaks between 70 and 74. Even those over 90 were found to be more satisfied with life than those under 64.

Generally, people have three choices: paying for care using existing assets and sources of income, buying a care annuity or using a combination of the two. Sound financial planning and advice can help you prepare and should ensure that, when the time comes, you have the information that you need to choose the right option.

This process will take into account income and assets, along with funding requirements, the likely length of time care will be needed and rising costs. In addition, plans for passing on assets to loved ones will be factored in.

Stresses in system

Growing stresses in the care system have made it more important than ever to plan for the future. The proportion of older people in the UK is rising rapidly, with the over-85s forecast to be the fastest-growing age group. In 2016, there were 1.6 million people aged 85 or over. By the middle of 2041 that is projected to double to 3.2 million.

At the same time, though, we are seeing a sharp increase in the number of care homes going out of business. Insolvencies are reported to have risen from 81 homes in 2016/2017 to 148 in 2017/2018, an increase of 83%. This has been blamed in part on rising staffing costs and low fees paid by councils, which are themselves struggling to meet growing adult social care bills.

Politicians have found it difficult to balance the need to adequately fund later life care with the desire of older people to pass on wealth to their loved ones. When he was Prime Minister, David Cameron pledged to introduce a lifetime cap on care costs of £72,000 by 2020. However, this policy was subsequently abandoned by the Conservatives.

Such uncertainty underlines the importance of planning properly for future care needs. By thinking about the issue well in advance we can help to ensure the best outcome when care is needed.

Sixty years of Barbie™

The world's most famous doll made her debut at a time when the fight for women's rights was gaining renewed momentum. She was intended to inspire young girls to believe that they could "be anything", yet during her 60 years as a cultural icon she has attracted as much criticism as she has praise. Has Barbie helped or hindered the fight for gender equality?

Nick Swales

Gender roles were firmly entrenched at the start of the 1950s. The post-war years had helped to cement a status quo of men as breadwinners and women as wives and mothers. But beneath the surface, particularly in the US, something was stirring.

I Love Lucy, one of the earliest TV sitcoms and the first to feature a woman in a leading role, hit America's screens in 1951. The central character, Lucy Ricardo, was played by actress and comedian Lucille Ball, who produced the show herself. Like *The Honeymooners*' Alice Kramden, who would continue the theme in another mouldbreaking comedy a few years later, Lucy was feisty, free-thinking and determined to carve out a life beyond her domestic travails.

It was amid such nascent flickers of gender equality's mainstream recognition that businesswoman Ruth Handler noticed how her daughter, Barbara, played with paper dolls. The youngster would treat them as adults rather than as children, and she would habitually accord women only parental or caregiving duties.

With all toy dolls manufactured in the US resembling infants, Handler set out to fill what she suddenly realised was a significant gap in the market. She found further inspiration during a trip to Europe, where she encountered Bild Lilli – a German-made polystyrene doll with an extensive wardrobe of fashionable outfits.

Handler doggedly petitioned the executives at Mattel, the company of which her husband was a co-founder. Although initially reluctant, they eventually backed her. On 9 March 1959, at the New York Toy Fair, the first-ever Barbara Millicent Roberts – better known as Barbie – was unveiled.

Barbie was intended to address the interrelated issues that her namesake's play habits had revealed. Handler not only wanted to sell a doll with adult features: she also wanted to encourage girls to frame their futures in less clichéd terms – to appreciate, like Lucy Ricardo and Alice Kramden before them, that women should not limit their ambitions to cooking, cleaning and child-rearing. "My whole philosophy of Barbie was that through the doll the girl could be anything she wanted to be," Handler once remarked. "Barbie always represented the fact that a woman has choices."

Just as Barbie sought to obliterate one stereotype, though, so she immediately set about perpetuating another. The Barbie that wowed New York was tall, slim and blond. She wore a zebra-striped swimsuit and sported a permanent sideways glance that was designed to convey the demure air of a fashion model. She could be thought of aspirational, which was good; but she could also be thought of hopelessly unrealistic, which – at least in some people's eyes – was bad.

A lifelong capacity to divide opinions was thus established at the outset. Barbie's 60-year history, during which more than a billion dolls have been sold, has since been punctuated by both an apparent determination to exert a positive influence and an unfortunate inability to please everyone.

Some of the most common reproaches have revolved around her appearance. For nearly 40 years her vital statistics were estimated to be 36" (chest), 18" (waist) and 33" (hips) – not exactly representative of the female population as a whole. Research by a Finnish university even warned that she lacked the level of body fat required for menstruation. She was given a wider waist in 1997, with "tall", "petite" and "curvy" variations following in 2016.

She has also been accused of lacking diversity. Hispanic and black Barbies were introduced in 1980, but their facial features remained Caucasian until an outcry prompted new designs. In 1997 Mattel produced Share-a-Smile Becky, Barbie's wheelchair-user friend, only to face fresh condemnation amid complaints that she was unable to squeeze through the doors of Barbie's famous Dreamhouse – less still into its elevator.

Yet perhaps the most hurtful criticism relates to Barbie's alleged ineffectiveness in highlighting the careers available to women. In light of Handler's original vision for her creation, condemnation of this kind calls into question much of Barbie's raison d'être.

Jobs for the girls

Barbie's professional career has been prolific, to put it mildly. Frequently reflecting and sometimes even presaging the times, she has had more than 200 jobs since she first entered the working world – as a fashion designer – in 1960. This dazzling versatility has always been intended to demonstrate creator Ruth Handler's belief that Barbie should inspire girls to "be anything".

Today, having marked her 60th year, Barbie, at least in her UK guise, is experiencing another corollary of the fight for gender equality. The retirement age for women is being aligned with that for men, meaning that she will have to work for another six years.

Here are just some of the roles that Barbie has held during the past six decades.

1960 – fashion designer
The original Barbie was essentially a fashion model, so a move into creating her own clothes was a natural progression.

1965 – astronaut
Barbie entered the space race four years before man set foot on the Moon. NASA had no women astronauts at the time.

1973 – surgeon
In an era when the idea of women in such roles was fanciful enough to inspire a feminist riddle*, Barbie ran an operating theatre.

1978 – business executive
Barbie set about shattering the glass ceiling by climbing the corporate ladder. By 1985 she would be a power-dressing CEO.

1989 – army officer
Barbie bucked a trend by assuming a senior role in the army. She would also hold lesser positions in the navy and the air force.

1992 – presidential candidate
This was Barbie's first bid for the White House. She has contested every election since, including on an all-female ticket in 2016.

1999 – airline pilot
Barbie enjoyed numerous stints as a stewardess and, later, a flight attendant before finally taking the controls of an airliner.

2008 – TV chef
With food channels proving a hit, Barbie got her own cookery show. Yet today most top kitchens are still male-dominated.

2010 – computer engineer
Barbie set about addressing the enduring issue of gender inequality in STEM by tackling the curse of downloaded viruses**.

* The riddle is as follows:

A father and son are seriously injured in a car crash. They are rushed to separate hospitals. When the boy is taken into the operating theatre the surgeon says: "I can't perform this operation – that's my son." How can this be?

It was once all but taken for granted that many people would not be able to see the obvious answer – that the surgeon is a woman.

** An accompanying book was famously withdrawn from sale after depicting Barbie as an incompetent who had to rely on the help of her male colleagues.

"Maybe the unhappy fact is that one person's role model is invariably another person's damaging influence."

Barbara Millicent Roberts has had more than 200 jobs since 1959 – starting, somewhat tritely, as a fashion designer. Having demonstrated her skills as an architect, an army officer, an astronaut, a CEO, a computer programmer, a doctor, a firefighter, a pilot and even a presidential candidate, has she made any difference to how girls perceive their employment opportunities?

There is still a conspicuous dearth of women in many sectors. Science, technology, engineering and mathematics (STEM) provide the most obvious examples. A 2015 analysis by *Fortune* found that women made up only a third of the workforces at the world's nine biggest technology companies and that the disparity intensified as ranks became more senior. Research by the OECD has shown that boys are still more likely to pursue a career in STEM, even though girls might perform similarly in relevant subjects at the age of 15.

Does this make Barbie a failure? Possibly. A 2014 study by the University of Oregon concluded that playing with Barbie left girls aged from four to seven limited in their outlook and that they were more likely to consider multiple options if they instead played with Mrs Potato Head. A popular theory is that Barbie's idealistic appearance simply compels youngsters to focus on their looks rather than on their professional prospects.

Professor Laurie Cohen, of Nottingham University Business School, has conducted numerous studies into gender inequality in STEM. Her findings suggest that it is "real" role models who can actually make a difference. "It's vital that young women are inspired by the success of others," she says, "but care is needed, because some role models may end up having a negative impact. Above all, the girls and women we spoke with wanted role models who could talk about their own difficulties and challenges."

"Our respondents weren't interested in 'superwomen' touting unrealisable dreams," adds Professor Jo Duberley, of Birmingham Business School, who co-authored the research. "They wanted role models they could relate to."

Maybe the unhappy fact is that one person's role model is invariably another person's damaging influence. This is certainly true of Barbie, just as it has been true of the many would-be champions of gender equality who have preceded and followed her. Lucy Ricardo constantly sought to expand her horizons, yet she was routinely portrayed as comically incompetent. Alice Kramden was strong-minded and resilient, yet her day-to-day existence stayed rooted in drudgery. Simone de Beauvoir, Madonna, Oprah Winfrey, Hillary Clinton – all have attracted their fair share of admiration and opprobrium alike. Nobody is perfect in the final reckoning – although Barbie, uniquely, might just be *too* perfect. The world's most famous doll has done what she can during the past 60 years, and Mattel's current Dream Gap Project underlines a resolve to carry on in the same vein; but Barbie will never be a cure-all for some of society's wider failings. In the words of MG Lord, the author of *Forever Barbie*: "The problem here isn't an 11.5" plastic object. The problem is the larger culture."

Role models

In March 2019, to mark Barbie's 60th anniversary and Women's History Month, Mattel unveiled a range of 20 "role model" Barbies in honour of women who have helped girls close the "dream gap". They included (from left to right) Maya Gabeira, surfer, Brazil; Naomi Osaka, tennis player, Japan; Kristina Vogel, cycling champion, Germany; Tessa Virtue, ice-skater, Canada; Yara Shahidi, actress, US; Adwoa Aboah, activist and model, UK; Dipa Karmakar, artistic gymnast, India; Chen Man, photographer, China; and Ita Buttrose, journalist, Australia.

Image: Mattel

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