Futurology The new home in 2050



Guide





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Foreword

Back in 2015 the Foundation published *Homes through the decades: the making of modern housing*^[1], which looked at the history of housing in the UK. The publication of that report prompted us to think more about how new homes would evolve in the future. We were not only interested in what new homes might look like; we also wanted to consider how they would work, given the rapid development of new technology. This in turn led us to commission the work that is the subject of the current report.

In setting the timescale for this exercise in futurology, we were conscious that if we tried to look too far ahead, we would end up with pure speculation. Conversely if we set our sights no more than a decade into the future, we would be thinking simply in terms of variations on current patterns. So we settled on the year 2050, just 32 years away, but likely to be a very different world to today's. Look back 32 years to 1986, and we can immediately recognise how things have changed – Margaret Thatcher was Prime Minister, cavity wall insulation was only just becoming common in new home construction, and the ambition to get to zero carbon was nowhere near the agenda.

2050 is a foreseeable time horizon over which we can reasonably expect to see the continuation of some current trends, for example further increases in life expectancy and so the prospect of a larger number of older people living at home. This is also likely to prompt more demand for opportunities for multigenerational living. We can also anticipate significant advances in technology, which will create both opportunities and challenges for the development of 'smart homes' in which many more of the functions that currently depend on decisions and actions by the resident will be automated.

This report written by Studio Partington provides an interesting insight into some of the trends we are likely to see 30 years or more into the future. The authors anticipate significant variations between the type of housing likely to be developed in different locations, urban and rural, to meet different needs. Particularly in the urban context there is likely to be greater emphasis on efficient land use. This in turn will probably prompt new layout designs that make the most efficient use of a building's footprint as well as further developments of micro-living. There will also almost certainly be demand for greater flexibility – allowing homes to be used by people at all life stages in various combinations, another key theme.

Of course, new challenges and trends are likely to emerge that cannot easily be anticipated. So we certainly need to remain open-minded to accommodate new pressures that as yet do not feature on the radar. But thinking ahead and considering on a regular basis how the homes we build will need to change to accommodate the demands that we can already see coming is a good way to ensure that we are not taken by surprise. I hope that you will find this report interesting and stimulating, and that it leads to further thoughts about some of the ways in which new homes will need to evolve over the coming 30 years and more.

> Rt. Hon. Nick Raynsford Chairman, NHBC Foundation

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Introduction

In the next 30 years we will witness substantial changes to home-life through technological advancement in response to societal, demographic and climate changes. The family home of the future will evolve to be more resilient and more adaptable to society's ever-evolving needs. We will see a resurgence of the 'multigenerational' home (see *Multigenerational living: an opportunity for UK house builders?*^[2]), a flexible home where the young can live into adulthood and where the elderly members of the family can be cared for.

The flexibility and adaptability that characterises many working environments will be more common in homes, allowing simple re-configuration of rooms and the creation of shared and family spaces to accommodate more or fewer family members; home-working spaces; and self-contained suites of rooms for different generations. The potential for homes to have flexible internal arrangements with lightweight moveable walls organised around fixed service 'cores' is already being trialled in new developments.

Technology will transform the home into a collector and storer of energy as pressure continues to grow on natural resources. This technology will be integrated with the built fabric of our homes – rather than fixing solar panels to roofs the roof covering itself will become the solar collector. Homes will become more connected, working as collective networks and accessible remotely.

This guide aims to provide an overview of the likely opportunities for the designer and resident of a future home.

In the first section we look at the physical characteristics of future homes and emerging models through case studies that may address some of the demographic and societal changes that will influence the future:

- Flexible family homes
- Third-age living
- Single-person households.

In section 2 we explore the emerging technologies for collecting and managing energy in the home, as well as technologies that will affect our lifestyles.

For further statistics on the demographic and societal changes noted above, see section 3.

Section 1

Homes for a bright future – how the home will look

Ideas for planning, organising and adapting future homes

New housing types are already beginning to emerge to meet changing lifestyles. With the lack of affordable homes in urban centres and the increase of people living alone – now 28% of all households in the UK in 2017^[3] – we have seen the rise of micro-living. Demographic trends from the last 20 years and projections for the next 30 years show an increase in people of the third age: pensioners and over 65 year olds. At the same time, increased living costs have driven children to live in their family home way into their early adulthood.



- Home connected to efficient district/neighbourhood heating systems
- 2. Secure ventilation located at head of stairwell
- 3. Shading devices help control overheating

4. Terraces and external spaces at upper levels

5. Living rooms on upper levels to exploit daylight and views

Model for a flexible family home: in a city setting

Homes will be arranged vertically on smaller footprints to increase density and make the best use of limited land. Additional storeys will have amenity space and terraces to compensate for smaller gardens. Internal partitions within the family home will be flexible to adapt to changing needs over a lifetime. Living spaces on top floors will benefit from views and from the relationship with external amenity.

The urban home will access district heating and energy networks. Overhangs and shading will help reduce overheating and green roofs will support biodiversity. Car ownership will be lower with more journeys taken on public transport, by foot and bicycle, or through the use of on-demand and ride-sharing services.



- 1. Heat pumps (ground and air source)
- 2. Battery storage
- 3. Large areas of photovoltaic (PV) panels
- 4. Electric car charging

Model for a flexible family home: in a rural/suburban setting

In rural settings, the traditional home arrangement will remain largely unchanged due to the greater availability of land, allowing homes to adapt and expand as families grow and working styles evolve. Living spaces will remain on ground floors and can expand into garden areas.

Lower densities will allow for greater 'solar access'. Roofs orientated to optimise solar access will become photovoltaic banks. Energy will be stored in the home itself, with batteries charged from solar panels and/or low-tariff electricity. Simple passive strategies for ventilation and cooling will be possible. The transition from petrol/diesel and hybrid to electric vehicles will have been made and each home will have induction or cabled vehicle charging.



Model for a flexible family home: townhouse

In the past, sharing a home with an elderly parent or a young adult may have been an inconvenient necessity. However, there is a growing and more positive perception of the multigenerational home as an answer to rising costs to property as well as care for the elderly. Research into changing patterns of household composition suggests that there could be 2.2 million people living in multigenerational homes and 3.8 million 21 - 34 year olds living with their parents by 2025. Of those living in a multigenerational household two in three people say that the benefits outweigh the disadvantages^[4]. Two obvious reasons are to care for an unwell relative and to help youngsters save for a deposit on a new home. Secondary benefits are:

- Bringing more income into the household
- Alleviating loneliness for the elderly
- Helping solve childcare issues.

Whether the home is shared with children returning from university or with an older parent, a home designed for multigenerational living will be accessible, ideally with the potential for lift access to all floors and providing sufficient living space to support interaction as well as privacy.

The example illustrated on page 11 is that of a compact family home designed to make efficient use of land and has the potential to double typical suburban densities as well as being able to accommodate different living requirements over time. Circulation and services are grouped into a 'core' so that a lift can be provided without compromising living space and so that each floor can be occupied relatively independently. Each level is almost like an apartment within the home.

Model for a flexible home: townhouse Based on a design by Julia Park, Head of Housing Research at Levitt Bernstein



Accessibility

- 1. Accessible bathroom/ shower room on each floor
- 2. Knock-out panels and enclosure for a lift (located in a 'core' and not compromising living space)



- 3. Stair and lift can be separated from living areas if needed
- 4. Balcony
- 5. Front garden and entrance
- 6. Utilities
- 7. Deliveries
- 8. Green roof to promote wildlife activity
- Passive measures to ٠ counter overheating



- Smart controls
- Zoned heating and submetered control for heating independent areas



9. Upper floor can be transformed into a secure, independent home







Ground floor



Model for a flexible family home: courtyard house

Another flexible home example is this home, part of the award-winning Accordia scheme in Cambridge. Family accommodation is arranged around a small external courtyard on the ground floor. The floors above are accessed from separate staircases – forming two independent suites of accommodation on either side of the shared courtyard. The ground floor also provides a separate home-working space or an additional bedroom.

Terraced gardens at upper levels compensate for the lack of gardens on the ground floor and add outdoor space to private parts of the home, giving each generation more autonomy.

Like the previous house, the layout shares many of the characteristics of the best models of multigenerational homes; they balance privacy with increased space for interaction and socialising as well as providing plenty of the essentials, for example bathrooms and storage (see *Multigenerational living: an opportunity for UK house builders?*^[2]).



Model for a flexible family home: courtyard house Based on a Feilden Clegg Bradley Studios house plan used at Accordia, Cambridge



Model for third age living: a lifetime home

With the rapid increase in population of 65+ year olds, there has been a boost in the construction of 'third age' homes – or Lifetime Homes^[5].

The principle for these homes is that they are flexible enough to accommodate the reduction of physical and cognitive mobility of the residents. Homes are therefore larger than the Government's nationally described space standard^[6], they have a lift and level access into and throughout the home, and level access showers. A second bedroom is provided to be used as a study, a temporary space for a carer or a guest room for visitors or grandchildren. The living area is large enough to accommodate furniture and possessions from a larger family home and has a private sheltered external amenity space. Importantly, the main living space is flexible and can be reconfigured. Individual front doors for each household promote a better sense of ownership and identification – the apartments are organised into distinctive 'shared villas'.

The communal facilities provide opportunities for gardening, mobility scooter and e-cycle storage areas, all looked after by facilities managers. Likewise, services such as heating and security are taken care of and can be accessed from communal areas but importantly can also be locally controlled inside the home.

Many of these characteristics are being adopted into local legislation for third age living, but it poses a question on whether they are good principles for homes in general: homes that allow families to grow, circumstances to change and to live in places that promote health and well-being.



Model for third age living: a lifetime home Based on a plan developed by Studio Partington for Greenoak Housing Association



- Wide entrance, accessible and furniture-friendly lift
- 2. Eye-level, accessible fridge and oven, nothing too high or too low to reach
- 3. Level access shower
- 4. Potential for ceiling hoist: direct route from bedroom to accessible bathroom
- 5. Generous manoeuvring space around bed and furniture



- 6. Ventilation control: manual boost at source and demand controlled
- 7. Ventilation unit accessible from common areas for servicing
- Thermostat and energy/air quality monitoring
- Door entry systems with video display
- Security alarms linked to the phone for remote monitoring



Health and comfort

- 8. Dual-aspect living room with good outlook offers cross ventilation to reduce overheating and maintain air quality
- 9. Weather-protected sun-space is an all-year private garden
- 10. Breakfast area catches morning sun
- 11. Good daylight for kitchen activities



- 12. Guest bedroom/study/hobby room /integral living space
- 13. Moveable wall, sliding partition or pocket door to subdivide space
- 14. Dotted lines indicate potential positions of internal partitions



Model for third age living: supported living

In the Netherlands, sociologist turned developer Dr Hans Becker adds a new dimension to supported living by promoting independence and selfdetermination for residents whose daily routine is structured more and more around a regime of medication and care. His theories recognise that some conditions cannot be cured, like Alzheimers or Parkinson's disease, but also maintain a positive belief that the quality of life for people suffering from these conditions is improved if the regime of medication does not become obtrusive.

In the pioneering 'Humanitas' apartments, the autonomy of the home is a potent symbol of independence and dignity. This principle of autonomy is used to counter the perception of living in an institution, as the individual is able to exercise control and live communally at the same time (see *Retirement housing: residents' experiences*^[7]). Carers must be let in by the resident, preserving the psychological independence of the resident.

Typically, developments following this model have a large number of apartments (400+) sharing common space and facilities, spreading the cost of care. For the model to work there needs to be enough people living together in the 'community' generating enough demand and income from the health spa, clubroom, restaurant, etc.

Some people may be put off by the perceived lack of diversity in such developments, whereas others find reassurance in being together with similar aged residents. Further innovations abroad have looked at the mutually beneficial effects of incorporating nurseries and crèches within the premises of supported living schemes – tapping into a ready made supply of helpers, bookreaders and play partners within the resident community.

Model for third age living: supported living Based on an apartment layout for supported living (using Humanitas principles)





- Line of sight from bed to living space allows less mobile residents to interact with their home from their bedroom
- 2. Accessible bathroom with dual entrances. Allows for direct access from bedroom



- 3. Sliding doors promote spaciousness and adaptability in the way spaces are used
- 4. Dotted lines indicate potential positions of internal partitions



- 5. Balcony and veranda
- 6. Good daylight and outlook from living room
- 7. Study/second bedroom
- 8. Secure front entrance
- 9. Kitchen window overlooks the internal street



Model for a single-person dwelling: micro-living

Purpose-designed micro apartments, homes and studios will increasingly appear in many urban areas. They offer self-contained dwellings with the private bathroom, kitchen and living space that cannot be enjoyed in a shared house. They will cater to a relatively mobile and young generation, in particular to recent graduates, as they offer an intermediate step between university and adult life. Their small size makes them a short-term home for some, as they are not adaptable for expansion or change that may be required later in life.

Cycle storage, communal lounges and shared services may be offered to make up for the small living accommodation, but micro-living tends to create homogeneous and temporary communities. Apartment designs will borrow from the ingenuity of caravan and boat designs, but the homes often impose lifestyle constraints. Residents have to live without too many possessions, and possibly live without the 'aspect and prospect' that Parker Morris considered to be important characteristics of the home^[8].

The layout illustrated on page 19 represents a micro-living apartment with a separate bedroom and kitchen. At 38m² it accords with the Government's nationally described space standard^[6] for a one-person dwelling. However, if the same home were to be occupied by two people (a double bed is shown in the layout) then the size would be 12m² smaller than the accepted standard.

Model for a single-person dwelling: micro-living Based on a scheme designed by HTA for compact living



Accessibility

- Open plan living/ kitchen/dining space
- 2. Space in the bedroom for a desk or dressing table and a cupboard
- 3. Shower (no bath)
- 4. Built-in storage cupboard
- 5. Built-in storage and services including heat interface unit



- 6. Floor-to-ceiling height windows for good natural light
- 7. Inexpensive to heat; centralised heating from communal boiler
- Communal service charges and running costs
- Secure communal storage to park a bicycle (no car parking)



Adopting an analytical approach to layout and room areas developed by the Parker Morris commission in the 1960s, the micro-dwelling provides the basic space necessary for living activities. The discussion about how and whether standards should be set goes back to well before the Parker Morris report, *Homes for Today and Tomorrow*^[8] in 1961, but an approach was established then that will be as relevant in 2050 as it was in 1961.

the right approach to the design of a room is, first to define what activities are likely to take place in it, then to assess the furniture and equipment necessary for those activities, and then to design around these needs, plus others no less important, such as aspect, prospect and communication with other parts of the home

Section 2

Technology and innovation

Together with the demographic and generational influences the rapid deployment of new technology will shape the future home.

The connected home: designing and building technology into today's new homes^[9] looks at many of the innovations that are commonplace or soon to be a common feature of the 'smart' home. It describes how technologies that are embedded in the work environment are now influencing home life. This section looks forward to the technologies that will be commonplace in 30 years' time.



Overview

The future home will be a supporting and nurturing home presenting numerous opportunities for well-being and independent living alike. Its ability to monitor health and activity could help shape the daily routine – reminding the forgetful to repeat basic tasks like taking medication and safeguarding from accidents, the overflowing bath, scalding water, doors and windows left unlocked. This plays an important role for relatives and carers of the elderly, as they can be reassured that all is well without necessarily making a visit. It will adjust lighting, ambience and entertainment to suit the resident's mood and has the potential to establish contact with nature. The home could reduce stress, enhance creativity and clarity of thought and generally improve health and well-being.

This section discusses how the future home evolves to tackle our dependency on fossil fuels and to make the supporting and nurturing home a reality (by tapping into renewable resources).

The future home will increasingly influence many aspects of everyday lives, unlocking the potential to work seamlessly from home, to stream music and films and stay in contact with relatives or colleagues in distant places.



- Heating and hot water is supplied by a communal or district system. PV on individual homes to power electrical equipment and charge vehicles
- 2. District systems tend to work more efficiently in dense or urban developments as installation costs are lower and less heat is lost through the network
- 3. A district scale energy centre makes efficient use of possible technologies:
 - heat from waste
 - combined heat and power
 - ground source heat

Various sources of energy for heat

Today, two-thirds of UK homes are heated from a gas boiler. Gas usage became widespread with the discovery of North Sea gas in the 1970s. Reserves are now nearly depleted and the UK has become a net importer of natural gas, exposing us to the volatility in the market and uncertainty of supply. In the meantime, renewable energy generation has become more efficient. As the proportion of electricity generated by non-fossil fuel increases so the carbon 'intensity' of the grid will decrease. In the future, therefore, there will be convincing arguments for using electricity to heat homes and hot water, either directly or through devices that convert low-grade energy to more intense heat, such as heat pumps.

It is likely that there will be different heating technologies available for homes and if current policy direction is maintained, a greater uptake of communal and district heating in urban areas. To respond to these opportunities the housebuilding industry will have to develop specialist skills for installing and maintaining different types of heating systems. Heat storage, in the form of thermal stores, will play a greater part; enabling the home to heat hot water when the sun is shining or when energy is cheap. Hot water consuming devices may operate intelligently when the stores are sufficient or heat water themselves when tariffs are low. The increasing uptake of electrical heating and hot water will also encourage the coupling of photovoltaic arrays with the home's heating system.

The controls that manage these systems will be more sophisticated, managing energy usage and calling on different sources (photovoltaic, battery, grid, heat pump) intelligently and cost effectively. Considering the relatively small newbuild house-building sector in the UK, the trends established abroad and in the retro-fit market are likely to predominate.



Low-energy homes

New homes in 2050 will be highly energy efficient, building on the good standards already achieved in current homes. More homes are likely to be built using off-site methods that should help to improve consistency and the technical performance of both fabric (the fixed elements that make the external walls, roofs and floors) and the services (the heating device, ventilation and metering). Off-site construction methods will also allow suppliers and manufacturers to develop whole-house solutions where the performance of fabric services and renewables can be optimised. In this approach the design of the home can be considered as an integrated whole, with the location of equipment, pipework and storage systems planned and executed in a controlled environment.

As the gap between the efficiency of new homes and the existing housing stock widens, home-builders' attention will increasingly focus on promoting the benefits of a new home and translating these into savings to the household budget. No doubt there will also be increased consumer interest in the actual performance of homes 'as delivered' and this in turn will drive the trend toward controlled production in factory spaces rather than on building sites.



App interface for an in-house energy management system showing (left) the energy use on a daily basis and (right) heating controls allowing 6 different zones to be controlled independently from any location

Energy management: smart use of energy

The future home will be able to manage its energy use from a centralised platform, combining heating, electrical consumption, ventilation and vehicle charging. Controls are also shifting towards wireless and remote platforms, consolidated into packages that allow many devices to be controlled from that same central source.

As energy prices continue to rise, as is expected between now and 2050, the urgency for managing energy efficiently will increase and homes will begin to adopt building management systems (BMS) that are already commonplace in non-domestic buildings. We will increasingly see homes that power down when the front door is locked or lighting and ventilation systems that respond to occupancy or movement. Non-essential equipment will power down or off completely when electricity is at a peak price without users having to worry about it, and will draw from the grid when the base supply is operating, topping up any storage system at a lower cost. This will keep energy bills down and reduce the amount of energy consumption, whilst contributing to a more worry-free lifestyle for residents.

Current building performance studies^[10] suggest that complexity (of both technology and controls) leads to under-performance and that simple intuitive (often mechanical) controls make for more efficient heating and ventilation systems. Technology will undoubtedly solve the complexity problem, allowing these systems to be accessible to the elderly and vulnerable. By 2050, a single universal platform will emerge, tackling the existing issues with compatibility between available services.



- Services are co-ordinated and distributed from a well-planned services core
- 2. Passive measures including shading and through-home ventilation mitigate overheating
- Services 'zones' in the external walls distribute pipework and cabling, freeing up internal partitions
- 4. Living spaces and roof surfaces (for renewables) are south-facing^[11]
- 5. Service terminations etc. located on the northern side

Planning services

Despite the trend for miniaturisation in electronics, some of the technology in the home will increase in size as we use devices for storing excess electricity or heat generated from renewable energy. Specifically, thermal storage in the form of enlarged insulated hot water cylinders will require additional physical space in the home. The interaction of heating, heat recovery and ventilation systems will also be more complex, with increased servicing, maintenance and controls.

Designing homes for the 21st century: lessons for low energy design^[12] explains the principles of good home design and advocates an approach, where services and equipment are considered and fully designed in the early stages. The services will increasingly be modularised or packaged in a pre-fabricated pod that is accessible for maintenance, metering and component upgrades. A schematic diagram of the 21st century home from the guide is illustrated above.



Responsive homes

Although predictions vary the consensus is that the effects of climate change will be felt by all of us. The impact on our weather will be complex, but the likelihood is that there will be more 'extreme' weather events: storms, increased rainfall in short bursts, higher peak temperatures and periods of drought. By 2050 temperatures are projected to have risen by a range of 2.8 – 5.4 degrees and, if no action is taken, an estimated 7,000 people in the UK could die prematurely from heat-related causes annually (though not all in homes)^[13].

Climate change adds another dimension to the complexity of smart homes, as systems will have to respond to 'summer' days in winter and 'winter' days in summer. This phenomenon is already beginning to be experienced in a small number of new homes, even those with good controls. For instance, underfloor heating, which is generally viewed as a good partner to heat pumps, has a certain 'inertia' that means it is less responsive to sudden changes. In homes of the future that have an even greater level of thermal insulation a sudden rise in external solar radiation will bring immediate heat gains and it will have to react quickly and start cooling as heat in the floor will continue to 'overheat' the room when switched off. The whole question of whether and how thermal mass can be used beneficially will need consideration (see also *Understanding overheating – where to start: an introduction for house builders and designers*^[14]) to avoid problems where stored heat is inadvertently creating overheating problems. However, thermal mass that is used to deliver tempered air at stable temperatures through devices like ground coupling may become more beneficial.

Features of an adaptable home



- Services 'core' and lift in logical position. Allows wet rooms to be 'plugged' in
- Light-weight partitions supported by floor structure without need for load-bearing walls below



Upper floor

- 3. Living rooms with wide spans on upper levels with external amenity space
- 4. Electrical services routed through perimeter walls, to allow convenient repositioning of internal partitions

A need for adaptability

Historically, homes and neighbourhoods have adapted well to change. The surviving Victorian housing stock has accommodated central heating, wiring, lighting and telecommunications, although installing a modern bathroom has meant losing or compromising a living space or adding an extension. In contrast, late 20th century homes have sometimes been criticised for a lack of storage and little scope for re-organisation to meet changing lifestyles and reduced mobility.

As housing demand has risen, together with the cost of moving and increased stamp duty, there has been a noticeable slowing down in the number of times households and families move. In contrast to the notion of the mobile young there is also a phenomenon of the rooted 'middle-age'. We need to futureproof homes, plan for longevity and changes, and build in the structural capacity to move walls, extend floors, build upwards or even downwards. This trend, together with the accepted social responsibility to make homes accessible, suggests that a good proportion of new homes should be built to be adaptable.

With services distributed around the perimeter walls of the home or through a floor void as in offices, the internal walls need only serve as acoustic and spatial separators that can be easily re-organised. Lighting will be controlled by movement detectors or voice activation, so the constraints of positioning switches and sockets are removed, creating more opportunities for homes to be adapted to a person's life.



An energy management system with battery storage allows the home to balance supply with demand. When available, renewable energy and low-tariff grid energy will be stored for later use.

An electrically mobile future

The coming decades will see rapid and transformational changes in the automotive industry. Electric and hybrid cars have already secured a sizeable share of the market with nearly all mainstream manufacturers developing the technology – driverless vehicles are soon to follow. The uptake of electric car usage is predicted to grow exponentially: by 2050 every home will have a battery and an electric car. Charging points for vehicles will be provided as a matter of course and will often connect into the home's renewable energy system. Homes may also have a separate direct current (DC) low-voltage ring main to power all electronic devices that currently use plug-in chargers.

Futurologists envision a change in the way 'mobility' is procured. With the emergence of car-hailing services, fewer vehicles are needed for the same number of trips and rides can also be shared. The need for private vehicle ownership will consequently drop, following an already emerging pattern in cities like London, where private vehicle journeys account for 32% of the total^[15]. This pattern may be more relevant to urban areas and thought has to be given to sustainable mobility in rural areas.

The physical landscape and wider sustainability benefits will emerge as a result of a reversal of housing developments designed around the car. Automated and driverless vehicles will use less space as they offer the potential for using carriageways more efficiently and negotiating junctions safely. The reduction in hard impermeable surfaces will relieve some of the pressure on surface water and drainage systems and contribute to the wider mitigation of flood risks. With cleaner air and the potential for more greenery and landscaping, where previously there was tarmac for parking, streets could be more civilised and enjoyable to use for pedestrians and cyclists.



Internet shopping and home deliveries

Shopping habits are changing and more purchases than ever are made online and delivered to the home (in March 2018 more than 17% of UK purchases were made online)^[16]. The limits of this phenomenon are hard to predict but home designs will make provision for shopping deliveries and take away the inconvenience of the 'we called but you were out' cards. The letter-box of the future will be more than a draughty hole in the door – big enough for parcels, clever enough to register deliveries and secure enough to protect valuable purchases.

The future home will manage access and security with 'smart key' solutions to give the delivery and service providers controlled access to the home. Another example of the increasing potential for operations to be controlled remotely, the smart key concept uses video footage of the delivery, and the safe closure of the external door, relayed directly to the owner's phone to demonstrate that security has not been compromised. Some routine shopping may even happen automatically, with fridges and freezers replenishing food when stocks are low.

Section 3

Facts, figures and footnotes

Statistics on the demographic and societal changes that will influence the design of future homes and communities.

One-person households

The number of single-person households is growing steadily due to a wide range of personal circumstances. More people are also choosing to live independently and many elderly people will outlive their lifetime partners.



People living with parents longer

The cost of new homes in some areas and the burden of debt incurred by young people during university will make the prospect of home ownership in young adulthood less likely. Many will remain longer in the family home while saving for a deposit or as an alternative to private rental.



Home and flexible working

Many people spend a proportion of their time working at home, either from choice or to fit around the demands of bringing up a family.



Ageing population

Most people can look forward to a longer life and an active retirement and many make plans for retirement living, possibly in a smaller home or within a community of similar people.



Area comparison guide for plans in section 1

The diagram below indicates scale and provides an area comparison for the examples illustrated in section 1.



1

Model for a flexible three-storey family home: townhouse

Example shown on page 11

Based on a design by Julia Park, Head of Housing Research at Levitt Bernstein

Total area 129m²

2 Model for a flexible three-storey family home: courtyard house Example shown on page 13 Based on a Feilden Clegg Bradley Studios house plan used at Accordia, Cambridge Total area 182m²

Area comparison guide for plans in section 1 continued



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The NHBC Foundation Expert Panel

The NHBC Foundation's research programme is guided by the following panel of senior representatives from the industry:

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The NHBC Foundation, established in 2006, provides high quality research and practical guidance to support the house-building industry as it addresses the challenges of delivering 21st century new homes. Visit www.nhbcfoundation.org to find out more about the NHBC Foundation research programme.





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