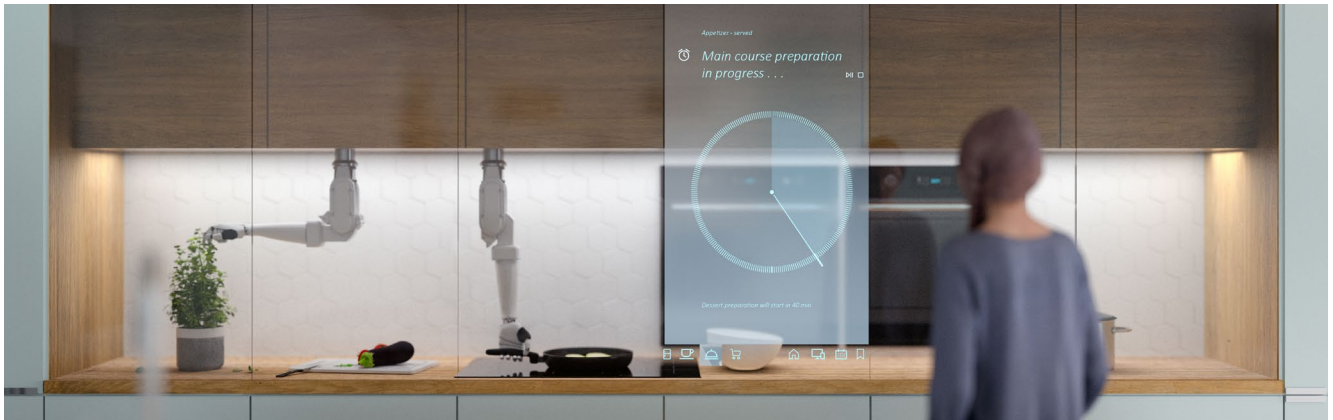


The smart home evolution is in full swing



Technology has been changing our homes for more than 200 years, as successive innovations have transformed our daily lives and the world we live in. Today, we are seeing the contours of a new stage in this evolution: a home that is smart and anticipates our needs, whether we work, play sport, learn, care or shop from home.

History teaches us that new technologies impact our lives profoundly, in turn affecting the homes we live in. Indeed, since the 1800s technological innovations have been the catalysts for our homes to pass through several stages of evolution. Each innovation has resulted in the rise of new industries that improve our lives and homes.

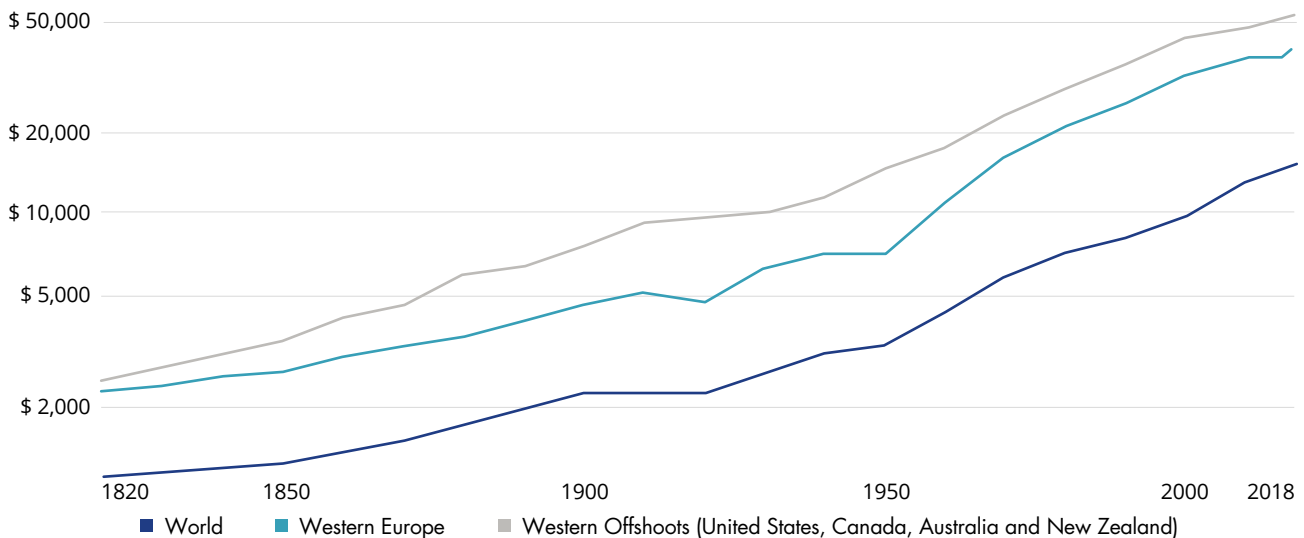
Today is no different: a new business ecosystem is starting to emerge around the smart home.

The Industrial Revolution: a turning point for homes

Until the 1800s, western economies grew very little and poverty was the norm. Most people just supported their daily existence and there was very little consumption in the modern sense. People had little choice about how to spend your money.

While technological innovations, such as windmills and early machinery, led to higher productivity, they only resulted in brief increases in living standards. This was because higher living standards spurred population growth, which meant more mouths to feed and resulted in a subsequent decline in living standards. Food production typically could not keep up with the growing population and rising food prices soon offset higher incomes, leading to political and economic instability.

GDP per capita, 1820 to 2018



Source: Maddison Project Database 2020 (Bolt and van Zanden (2020))

Following the Industrial Revolution, for the first time populations could escape this so-called Malthusian trap.¹ New technologies not only improved productivity, but also changed the way people lived. For the first time, they were able to raise their real incomes and living standards, leading to visibly improved lifestyles and better houses. Welfare improvements and more free time meant that people could buy goods and pay for services that previously were never part of their household budgets.

Moreover, as people's incomes and living standards improved, they started to have more time and money to spend on things other than bare necessities such as food and shelter. As new technologies emerged, the home's function changed, as did the amount of time spent at home. New markets and industries emerged to cater to new demands.

Since the 1800s, the home has passed through at least five major iterations, which are described in the next section. This illustrates how, since the Industrial Revolution,

technology has enabled us to change the functions of our homes. Prior to the Industrial Revolution, our homes were multi-functional spaces where we lived and worked; but since then functions have left the home as we have sought food and entertainment away from home.

Today, though, the home is returning to its roots. Broadband internet, sensors and connected devices are enabling us to return more functions to the home. In this emerging smart home, our houses will be able to anticipate our needs and fulfill multiple functions: office, gym, school, entertainment center, health center, etc.

In its ultimate form, our smart home might adjust temperature settings, background music and food intake automatically. Virtualized home environments could enable us to study or work remotely while still connecting with colleagues and students. At the end of the working day, home entertainment and ecommerce services could be enjoyed. The Smart Home ecosystem is still evolving and the possibilities are endless.

Moving functions out of home



Until 1800: The home workshop

Until the 1800s, the home was as much a workshop as it was a place to live and sleep. People were mostly self-employed: they produced food and goods in and around their houses, which included farms, blacksmiths, bakeries and traditional craft workshops. Traders might buy some of their products and transport them to other areas. This rural or cottage industry was a kind of distributed factory: for example, women would spin cotton or weave textiles from their homes, selling their products in markets or to traders.



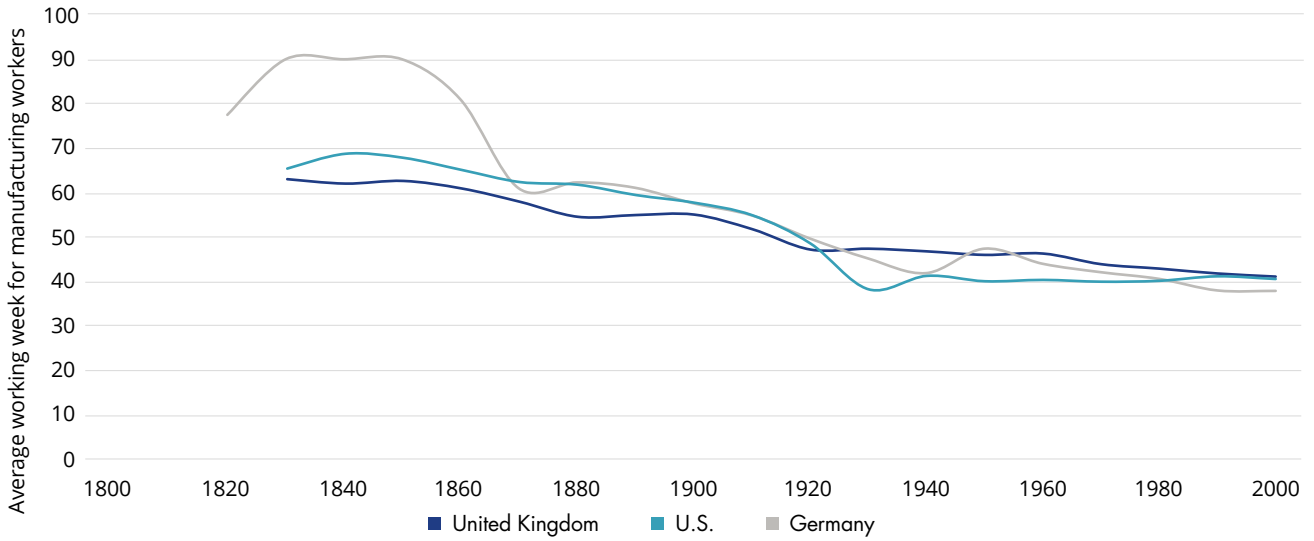
1800-1900: The home farm

Following the Industrial Revolution, work mostly shifted to factories where people (sometimes whole families) worked long shifts (see graph). Workers moved to the cities where factories were located, resulting in fast urbanization. While workers' houses were not big, those with small gardens still used them to grow food or keep hens or other productive animals. Moreover, living circumstances were far from ideal. Nevertheless, most people in the working class preferred this to the uncertainty and seasonal nature of agriculture.

From the second half of the 19th century, welfare also started to improve for the working class. They could move to emerging suburbs, where they had larger gardens. Railways made it possible to deliver fresh food into ever bigger cities. No longer needing the garden for food, gardening became a new way to spend free time.

¹ In an essay on the Principle of Population (1798), Thomas Malthus stated that if a society could not produce enough food, the cost of living would rise and the economy become unstable.

Working hours in Germany, U.S. and United Kingdom 1800-2000



Source: OECD

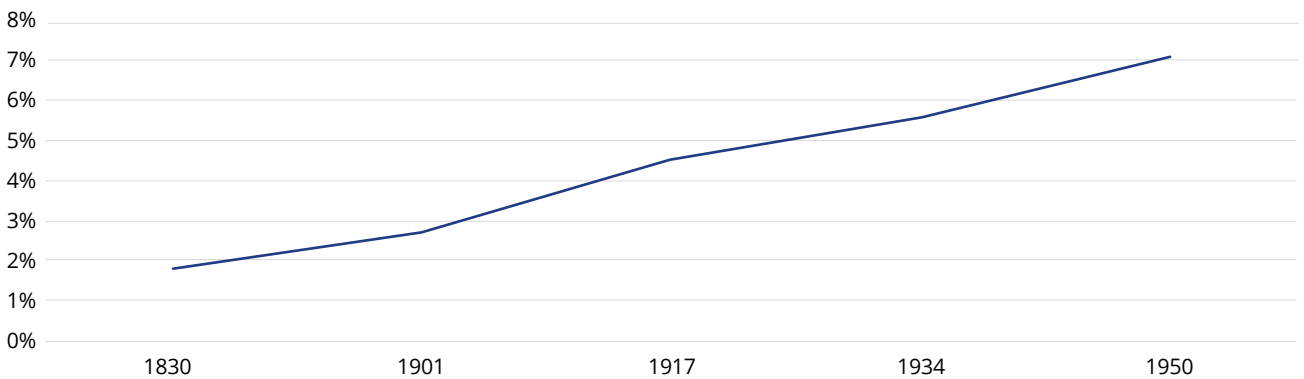


1900-1950: The minimalist home

From the start of the 20th century, higher incomes and more free time gave rise to new forms of out-of-home entertainment (e.g. cinemas, variety theatres and amusement parks). Moreover, greater mobility enabled by new forms of transport – such as the bicycle, tram and car – made it possible to find entertainment further away from home. Combined, these developments turned the home into a place where people merely ate and slept.

The house itself, however, became more comfortable with electric lights, gas cookers, refrigerators and central heating. Other appliances such as electric irons, fans, toasters, washing machines and vacuum cleaners made it easier and less time consuming to run a household, further increasing free time. Studies show that between 1900 and 1970, hours spent on household chores dropped from 58 hours per week to 18.

Percentage of income spend on entertainment



Source: David, Paul, and Peter Solar. 1977. A Bicentenary Contribution to the History of the Cost of Living in America. Research in Economic History 2: 1-80.

Houses became more comfortable

	Households with a refrigerator (%)	Households with a washing machine (%)	Households with a vacuum cleaner (%)
1920	1%	8%	9%
1930	8%	24%	30%
1940	44%		
1950	80%		54%

Source: From Luxury to Necessity, p. 89

Bringing functions back to the home



1950-2000: The comfy home

In the previous home iteration, electrical appliances improved home comfort, but radio, TV and telephones brought this up a notch. These devices made it possible to enjoy entertainment at home at a lower price than going out, for instance to the cinema. The living room became the TV room and people started to spend most of their leisure time behind their front doors. Moreover, these devices gave rise to a multibillion dollar media industry devoted to producing content and selling advertising.



From 2000: The smart home

With the emergence of broadband internet, PCs and smartphones, the home became fully connected. New connections allowed users to communicate and cooperate with the world outside, while controlling all sorts of appliances and devices within the home, such as for climate control or entertainment. As a result, the home started to regain long-lost functions and develop new ones. Digitalization allows us not only to work from home once more, but also to shop, attend classes and provide care for each other. Our homes are even becoming sustainable energy generators, as well as places where we produce digital content that we can share with the world.

More recently, we have seen how the addition of intelligence – for instance in the form of smart speakers, smart home hubs or networks of sensors – enables us to develop genuinely smart homes. These technologies lead to a full integration of different applications and services, which communicate with each directly, so dramatically increasing our comfort.

The implications of this intelligent, connected home are broad, touching all aspects of our daily lives. Accelerated by the pandemic, the home is once again becoming the center of everyday life and work. Networks, automation and autonomous systems blur boundaries between home and the outside world. In this increasingly virtual world, technology enables almost every aspect of our lives to be conducted from the home.

As with all previous ages of the home, this fundamental change in the way we live will have enormous economic implications. The transition to the smart home will be accompanied by new business models: more and more, products are not owned but accessed or shared; they are delivered to the doorstep, or they form part of a service within the broader smart home ecosystem.

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The VanEck Vectors Smart Home Active UCITS ETF (ISIN: IE000FN81QD2) enables investors to buy into the smart home megatrend. With the smart home evolution starting to influence all areas of our daily lives, it is already changing the way we shop, work, communicate and entertain. A new and smart ecosystem is starting to develop around our homes, creating many opportunities to invest. Contact your advisor for more information about this product.

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