

NEIGH BOUR HOODS OF THE FUTURE

TECHNOLOGY

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Home smart home

In the spirit of looking forward, a principle this publication is built on, we invited Jakub Rozanski and Katarzyna Mackowiak, of architectural and design visualisation studio, We Mapout, to reimagine what a retirement home might look like in the next twenty years.

Their concept encompasses an expansive building type, with bespoke, prefabricated units which slot into a steel grid structure. Featuring large outdoor terraces and double height living spaces, the building is designed to embrace natural light and facilitate the growth of free-standing plants and trees.

Jakub and Katarzyna were inspired by Milan's 'Vertical Forest', an award-winning development which uses more than 20,000 trees and shrubs, each positioned according to their resistance to wind and preference for sunlight and humidity. Speaking to 'thejournal.ie', the forest's architect, Stefano Boeri, explains that beyond the aesthetic his design is a weapon to combat climate change:

"Cities now produce about 75% of the CO₂ present in the atmosphere. Bringing more trees into the city means fighting the enemy on the spot."

In this section, Jakub and Katarzyna highlight innovations in design and architecture, together with a selection of new products and services, which could improve, and in some instances revolutionise the quality of life for older adults in years to come.

Photo credit: Image courtesy of Ian Spero





Lanzavecchia + wai: no country for old men domestic objects for the elderly
<https://www.designboom.com/design/lanzavecchia-wai-no-country-for-old-men-domestic-objects-for-the-elderly/>

X cobalt robotics security droid
<https://www.designboom.com/technology/yves-behar-cobalt-robotics-03-01-2017/>

Ge wattstation
<https://fuseproject.com/work/ge/wattstation/?focus=product>

The future of car sharing
<https://www.designboom.com/technology/smart-vision-eq-fortwo-autonomous-electric-concept-carsharing-08-30-2017/>

Yves béhar debuts hive view outdoor security camera
<https://www.designboom.com/technology/yves-behar-hive-outdoor-security-camera-11-29-2018/>

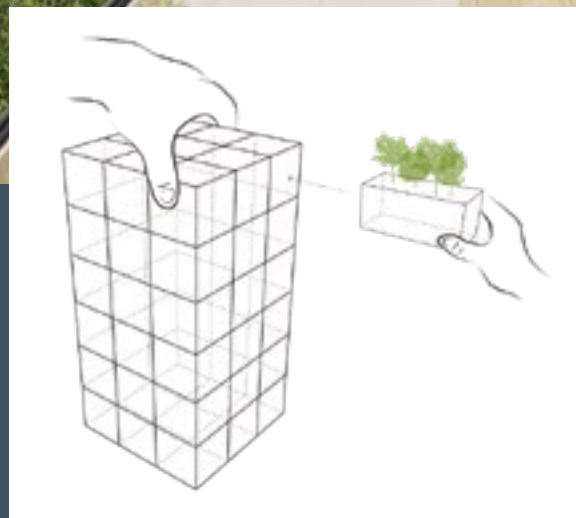
Intuition robotics elli•q
<https://www.dezeen.com/2017/01/11/elliq-robot-yves-behar-fuseproject-helps-older-adults-stay-connected-world-design-technology/>

PriestmanGoode's Scooter For Life
<https://www.dezeen.com/2017/01/12/priestmangoodes-scooter-life-older-people-stay-active-design-museum-new-old-exhibition/>

Postmates – delivery robot
<https://www.designboom.com/technology/postmates-serve-autonomous-delivery-robot-serve-12-14-2018/>

Pavegen's floor tiles could power future cities with footsteps
<https://www.dezeen.com/2017/10/27/movie-mini-living-pavegen-flooring-system-power-future-smart-cities-video/>

Exterior



Concept for expansive building. Bespoke prefabricated units slot into steel grid structure

- Large open courtyards with visible pathways
- Enclosed social spaces with plants and seating areas
- Large open balconies
- Pharmacy and other services located on the ground floor

- Secure and friendly environment
- Vertical design – Architecture
- Vertical gardens
- Interactive facade – Shading system for living comfort
- Exterior lighting – Way finding system



Google Daydream View virtual-reality headset
<https://www.dezeen.com/2018/11/21/fabric-covered-gadgets-technology-cosy/>

Kuri robot
<https://www.dezeen.com/2017/01/05/kuri-home-robot-mayfield-robotics-ces-consumer-electronics-show-technology/>

Segway loomo robot
<https://www.designboom.com/technology/segway-loomo-robot-01-08-2018/>

Virtualphones Technology
<http://www.futurelab.sony.net/N/technology/>

Care-O-bot 4
<https://www.care-o-bot.de/en/care-o-bot-4.html>

Interactive Table “T” Future Lab Program
<http://www.futurelab.sony.net/T/>

Intuition robotics elli•q
<https://www.dezeen.com/2017/01/11/elliq-robot-yves-behar-fuseproject-helps-older-adults-stay-connected-world-design-technology/>

Icaros combines fitness and virtual reality
<https://www.icaros.com/>

U touch interactive screen
<http://www.u-touch.co.uk/touch-wall/>

i-SIT resting chair
<http://inclusivedesign.no/furniture-and-interior/i-sit-resting-chair-article129-263.html>

CarePoint – Philips
<https://philipsseniorliving.com/carepoint/>

Home Smart Home research, visualisation and CGI images courtesy of Jakub Rozanski for WE.MAPOUT Architectural & Design Visualisation Studio Manchester

Communal living space

- Interactive wall screen
- Large windows
- Adjustable pendant lighting systems
- Outside communal space with access to vertical gardens
- Bridges that connect to neighbourhood towers
- Smooth surfaces
- Fall detection floor with light fitted sensors
- Use of acoustic panels (ceiling)
- Dedicated space for exercising



Kitchen living space

- Interactive wall screen
- Large windows
- Adjustable pendant lighting systems
- Outside communal space with access to vertical gardens
- Bridges that connect to neighbourhood towers

- Bio wall (growing your own food)
- Smooth surfaces
- Easy access to plugs
- Use of colour for visual impairment
- Fall detection floor with light fitted sensors
- Use of acoustic panels (ceiling)

Postmates – delivery robot

<https://www.designboom.com/technology/postmates-serve-autonomous-delivery-robot-serve-12-14-2018/>

British gas hive view

<https://fuseproject.com/work/british-gas/hive-view/?focus=overview>

Intuition robotics elli•q

<https://www.dezeen.com/2017/01/11/elliq-robot-yves-behar-fuseproject-helps-older-adults-stay-connected-world-design-technology/>

MiRo

<http://consequentialrobotics.com/miro/>

Food Probe by Philips Design

<https://www.dezeen.com/2009/09/08/food-probe-by-philips-design/>

Moley robotics – kitchen robot arm

<http://www.moley.com/>

<https://www.smithsonianmag.com/innovation/robot-make-me-dinner-180957535/>

Care-O-bot 4

<https://www.care-o-bot.de/en/care-o-bot-4.html>

Aged Care virtual reality

<http://www.agedcarevirtualreality.com/>

Samsung Family Hub – Interactive Refrigerator

<https://www.samsung.com/us/explore/family-hub-refrigerator/overview/>

Pull Down Cabinets – Kitchen ideas

<https://ageinplace.com/at-home/aging-in-place-home-ideas/kitchen/>

Technology for health and wellbeing – an NHS perspective

Professor Wendy Tindale OBE
CEO, NHS England Test Bed, Devices for Dignity

Philippa Hedley-Takhar
Business Development Manager, Digital Care Home
– NHS England Test Bed, Devices for Dignity

The NHS is a system under unprecedented strain.

With demand for care exceeding funding growth and provider capacity, the current model of health and social care is widely acknowledged as unsustainable in light of our ageing population. Many individuals are encountering difficulties living in their own home due to the collective effect of ageing, frailty and overlapping complications of long-term conditions. This has contributed to year-on-year increases in admissions to hospital.

Patients are delayed in being discharged from hospital back to home settings, due to waiting for care packages to be available at home or availability of beds within nursing homes. This is adding pressure to an already fragile health system. There is an ever-increasing urgency for the system to change and evolve.

The message from the top

These challenges to the healthcare system require bold responses.

The Health Secretary has made it clear that we ‘can’t wait’ to shift NHS spend away from hospitals in order to grow GP and community services which focus on preventative measures. We know that

successfully digitising the NHS will be essential to achieving the triple aim of better health, better healthcare and lower cost. Technology has the capacity to create efficiencies in the delivery of care, early diagnosis and personalisation of treatments, and transform the ability of individuals to participate actively in their own care and management of long-term conditions.

The vision and direction of travel within health and social care is working in partnership with ‘Integrated Care Systems’ which comprise NHS organisations, local authorities and other partners. These would then take collective responsibility for managing resources and improving the health of the population they serve.

The need for a system-wide response and shared responsibility not only means investment and re-allocation of resources in the NHS, but also investment in future homes, communities and wider services. We need creative approaches to using assistive technologies, and to design services to meet the wide variety of circumstances, aspirations and needs of people as they age.



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Innovation in partnership

Artificial intelligence has the potential to revolutionise healthcare. Point of care diagnostics are accelerating the journey from early diagnosis to treatment. And telehealth is taking outpatients conversations from the hospital to the home environment. If there is a national commitment to making use of these technologies in delivery of care, exciting opportunities emerge.

These opportunities extend beyond public services. Could future homes facilitate access to peer support networks as solutions for social isolation and loneliness? Could technology and the built environment support individuals through social prescribing, voluntary networks and the use of community resources and assets? We could see improved health, emotional wellbeing and social inclusion, creating a connection between the citizen and the neighbourhoods where they live.

There is no shortage of innovation from within the NHS. The challenge lies with the capacity to take that creativity and expertise from concept to reality, and to evidence the value and impact of working in new ways delivering cost efficiencies and improved health outcomes and experiences. Fortunately, investment in NHS innovation infrastructure is growing this capacity and recognising the importance of collaborative working with partners.

Devices for dignity

Devices for Dignity¹ is a national MedTech Co-operative embedded in the heart of the NHS. It acts as a catalyst for the development of new technology and connected health solutions to meet clinical needs. Many of these needs are associated with loss of dignity and independence. Crucially, it operates in multi-stakeholder partnerships

from across health and care and industry, and with the patient and public voice at its heart.

Devices for Dignity's person-centred care approach has led to the 'Digital Care Home', a digital solution which predicts risk of health deterioration and integrates information from care home residents into patient records. These can be accessed by health teams for joint decision-making, with the aim of reducing demand on emergency services and avoiding hospital admissions.

Building on our principles

Solutions building on the principles of the Digital Care Home can support an ageing population living independently or in a supported living environment. We have the opportunity to create living spaces where assistive technologies are part of the fabric of the built environment. Innovation in assistive technologies through engagement with clinical networks and patients working with specialist organisations like Devices for Dignity are making huge leaps on the journey to take healthcare out of hospitals.

Recent breakthroughs:

- Patients can take dialysis to the home in the form of portable units.
- We can test for atrial fibrillation (which increases the risk of stroke) using a handheld mobile device at community pharmacies.
- We can use text messaging telehealth solutions to communicate with community nurses and GPs for virtual home visits using smartphones.
- We can use virtual reality robotics to aid home-based rehabilitation.
- We can monitor medication adherence for people with asthma and diabetes.

- We can place ambient sensors in the home environment to provide information to carers, families and health professionals about the safety of the more vulnerable population, such as those living with dementia.

These innovations are already improving lives. However, a technology 'push' is not enough. If we want to be truly transformative, services will need to be redesigned to maximise the value and acceptance of technology, with adaptive housing in our neighbourhoods of the future which avoid living spaces that look like a hospital ward.

Putting the users at the centre

Digital transformation in health is an ongoing journey that requires putting the user at the centre. Services and systems need to take the people with them and empower them to take ownership. Change requires a shift in the power dynamics between citizens, patients and health professionals. To make this possible, we need to anticipate any obstacles to the adoption of the new technology.

Engagement with the ageing population and provision of training and support for digital inclusion will be essential for sustained long-term use. Meaningful co-production with citizens brings users

of services into the partnership as those best placed to help design for the future. It leads to better use of resources, increased capability-building for individuals and communities, and more effective outcomes.

Devices for Dignity's ambition, by working with people to understand how they want their homes to work for them as they age, is to define and co-create the 'Future Digital Neighbourhood', an intelligent platform for residents to link assistive and lifestyle technologies and robotics which are specific to their personal needs. A platform that builds on artificial intelligence to generate information and knowledge which can be applied to give people the confidence they need to live the life they want, removing barriers to participation in society and enabling self-management and supported care to be delivered irrespective of location. This supports people in moving away from a medical model of care to one of lifestyle choice and helping to make loneliness and social isolation a thing of the past.

We need to support active ageing in our older populations today and, in parallel, provide a test bed for ongoing adaptation and technology innovation as user needs evolve in response to the question 'What matters to you?'

¹ National Institute of Health Research Devices for Dignity MedTech Co-operative

Photo credit: Images courtesy of Devices for Dignity



Know before you go – The transformative power of building information management (BIM)

Alex Small
BIM and Digital Platforms Manager, Tata Steel

A number of articles in this white paper talk about the need to build homes off-site using modular platform-based production methodology. At Tata Steel, we see this as an excellent opportunity to revolutionise a static housing market. Innovation in construction and advances in technology have opened up new horizons for architectural design. But as this development increases levels of complexity, there is a corresponding increase in the likelihood of errors.

For decades, a lack of coordination has led to clashes, errors, inefficiencies and bodged quick fixes which caused projects to overrun both their schedule and their budget. Additionally, not having key information like maintenance requirements readily available on building assets has caused huge inefficiencies in operational and facilities management. The only way to increase reliability and productivity is to make the whole process more efficient from end to end. This should also result in housing which is faster and cheaper to build and maintain.

This is where Building Information Modelling (BIM) comes in.

There are many definitions of BIM, but all of them agree on the key elements: the utilisation of 3D CAD platforms, interoperable data and working collaboratively. By making data machine-readable in 3D models, it can be accessed and utilised in a myriad of ways. This enables digital platforms, such as facility management tools, to make information immediately and freely available to anyone along the lifetime of the asset.

A 3D BIM model helps facilitate coordination between the construction supply chain. It can act as a “Digital Twin” to make information visual and interactive on all the elements of the architectural and structural design, as well as on electrical, mechanical and plumbing services.

It is this level of detail, and the ability to build and easily amend an interconnected design, that makes it ideal for mitigating the problems caused by changes, clashes, misalignments and errors. And that same information is made available for the operational management of the building.

The levels of BIM

There are three established “levels” of BIM.

Level 1 requires coordination between the construction supply chain and encourages the adoption of 3D CAD. (This is, generally speaking, where we are now.)

Level 2 requires 3D CAD to be utilised, with models being passed between all parties to improve collaboration. It also necessitates the addition of structured product and project data (such as maintenance and performance data) to enhance the detail in the model – (Current best practice is getting close to this.)

Level 3 seeks to have one 3D digital model that all parties contribute to. Interconnected systems and IoT integration enhance the quality and depth of data as well as the functional capability of the asset. (This is the future.)

As you progress through these levels, the increasingly efficient usage of information drives productivity improvements. For example, in Level 2, if a facilities management company was told that a light bulb had blown in an office on the second floor, they would be able to quickly find out not just what type of lightbulb was needed, but also what size of ladder would be required to change it. We call this “know before you go” and it helps drive operational efficiency. In Level 3, the light bulb would be “smart” and would send a message to the company suggesting it be replaced before it evens flickers. This is called “predictive maintenance” and helps drive functional efficiency.

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Opportunity lies ahead

As the industry starts to understand the opportunity that lies ahead, construction product manufacturers are being called on to lead the charge. They are thinking increasingly within a framework of componentisation. Manufacturers make products; products make systems (or assemblies); systems make buildings. By starting with the individual products, or components, you have the range of parts needed to build anything you like. (Think LEGO!)

This concept of componentisation has many benefits. Firstly, you can link every physical asset to a digital component in a 3D model, either uniquely or as part of a system. This means that, as you install them on site, you can build a 3D digital replica (a Digital Twin) of the construction progress. This certainly improves programming and planning but also enables a wide range of benefits, including simplifying invoicing, product performance and provenance, commissioning, maintenance and handover. This why in his recent review of the construction industry entitled “Modernise or Die”, Mark Farmer suggested the “Manufacturer-led construction” could be one of the main drivers for change in the industry.

As Terry Stocks will explain in his contribution to this publication, huge potential productivity benefits can be gained by manufacturers collaborating with the industry to develop new, standardised components and digital tools to enable faster, simpler, building design and assembly/construction on and off site. As steel becomes an ever more significant enabling component of modern housing, this is where Tata Steel aims to add huge value.

There is no doubt that BIM is a key driver, but the opportunity is wider than that. Technologies such as blockchain can help provide confidence in product provenance and in-use performance. Artificial intelligence and IoT implementation can be used at all stages in a project, from enabling flex of supply chains during construction to managing building performance and energy use. The future vision for housebuilding could be that potential buyers can create their own house design online and see it built within weeks. A well-oiled supply chain using rules-based generative design tools, offsite manufacturing efficiency and the right, smart products can achieve great things.



Applied artificial intelligence in our global neighbourhood

Daniel Hulme
CEO, Satalia
Director, UCL's Business Analytics MSc

Over the coming few decades, AI is going to bring about a massive change in the way we interact with our environment, and each other. This shift will raise many ethical questions, and will force us to reassess our social and economic models. Many of the questions that philosophers have been pontificating over the millennia will now have to be practically addressed. But what should be the goal of a smart city or neighbourhood? I hope that countries will optimise for happiness as opposed for GDP, and I hope that we will start to cooperate as a united planet instead of a divided one.

The best definition of intelligence that I've ever found is "goal-directed adaptive behaviour", by Steinberg & Salter (1982). Without an objective – a goal – it's impossible to compare the success of one intelligent system over another. Naturally, the system has to have the ability to move – or behave – towards a goal. The critical element that distinguishes the intelligence of one system over another is its ability to adapt. If a system can adapt its physical body and mental model faster and better than another system with the same goal, then I would argue that it's more intelligent.

Evolving our environment

Through the process of evolution, biological life has developed physical and mental plasticities which allow it to adapt to the environment, such as the ability to regulate temperature, to learn from mistakes, and to change pigment as camouflage. Our bodies interact with the environment in complex ways, like foraging for food, seeking suitable mates, and fending off predators. Some

biological life has developed the ability to not just adapt itself to the physical environment, but to adapt the physical environment to itself, such as building nests, cultivating food and setting traps. Some species collaborate to form complex societies and even cooperate with other species to form ecosystems to increase their robustness and resilience. Others have even developed tools and technologies that have extended their physical reach so to adapt the environment to better suit their needs.

We've learnt to master fire and electricity, to heat our homes and communicate over incredible distances. It could be argued that humans are the most adaptable species on this planet. We can't fly or survive underwater, but we can adapt our environment and build technologies that enable us to survive in even the most hostile places. Perhaps there are more resilient and robust species – ones that could survive unpredictable changes in our environment such as an unexpected volcanic eruption that would make our atmosphere uninhabitable by humans – but there are arguably none as creatively agile as us.

For millions of years, biological life has been intelligently adapting its environment to enable it to thrive. However, since the start of this century our species has established a new paradigm; we've begun building environments that intelligently adapt to us. AI is starting to be used to automatically control the temperature in our homes, recommend what products we should buy, and advise us about what to eat to live longer, healthier and happier lives. Like biological systems, AI consumes data from a myriad of sensors. Whether we carry these devices around –

like our phones – or they are embedded in the walls and objects we interact with, we're seeing an explosion of sensory data that is being mined for insights. This technology is often called the Internet of Things (IoT), and it's becoming the eyes and ears of AI.

Environments building environments

If Moore's Law continues – where computing doubles in speed every 18 months – then over the coming decades these devices will become exponentially smaller, perhaps small enough to run through our veins and gather detailed data about our physiology. This data will surface insights that will enable our environment to intelligently interact with us in ways we can't yet imagine. Some people believe that it will even allow us to cheat death.

Aside from predicting when to make us coffee or when our autonomous car should pick us up from the office, our environments will learn to make our lives more comfortable by collaborating and interacting intelligently with itself. 400 million years ago the formation of the earliest eyes caused the Cambrian Explosion of diverse biological life. I would imagine that we will see a similar explosion of technology, stemming from the convergence of an abundance of sensory data with the ability of our environments to reconfigure and perhaps construct themselves without human intervention or guidance – environments building environments.

The intelligent environments we're building form the fabric of our physical and digital interactions. With virtual and augmented reality on the horizon, we might see people living more and more in virtual worlds; worlds that allow us to suspend all of physics and reality. Perhaps we can't yet imagine how magnificent and absorbing those worlds will

be, or how they will evolve. We don't know how it will change the way we interact with physical and virtual objects, AI agents and each other. Nor do we know what impact these adapting environments and intelligent worlds will have on our physiological development, emotional intelligence and social attachments.

The ethics of AI

For millennia, philosophers have been debating about how society should be structured and what it means to live a 'good' life. As our environments start intelligently interacting with us we're giving them the power to create and destroy. We have to embed ethical behaviours into these systems, which makes it an extremely exciting time for humanity, because we now have to agree on what those ethical behaviours should be.

Blockchain technology is giving the world a trusted data platform, and AI is providing the means to collaborate and connect without friction.

Blockchain technology is giving the world a trusted data platform, and AI is providing the means to collaborate and connect without friction. Over the coming decade we might see the emergence of a DAO (Decentralised

Autonomous Organisation) that will allow for truly decentralised and distributed decisions and actions. I can imagine a world whereby anyone could boot up a project by launching a DAO that enables contributions from anywhere in the world. The DAO is similar to the open-source movement, but in this new paradigm, anyone – software engineers, designers, marketers, accountants and even strategists – will be able to rally around an idea and contribute to its development. Work won't be provided for free or kudos, as in the open-source model: instead, fiscal remuneration will be determined by the quantity and quality of the contribution. This means that anyone will be able to contribute to a project, even just for a few hours, and they would be rewarded fairly for their work. As people work on these open projects, the DAO captures their contribution on a public blockchain. These contributions accumulated to form a reputation that determines the rate of remuneration on future projects. People develop different rates for different skills, and the rate evolves dynamically over time. You would be paid a different rate for marketing work than for software development, depending on your relative skill in each.

A cambrian explosion of funding models

Many of these open projects will use digital tokens as their economic model. A Cambrian Explosion of funding models will appear, such as ICOs (initial coin offerings) and other types of token sales. Selling tokens will give DAO projects the capital to get started. By reducing the waste and friction we may reach a point whereby new innovations help ensure that everyone's basic needs are met. Giving everyone seamless access to healthcare, nutrition and education will mean that people have the freedom to create and contribute to DAO projects without the need for initial funding. Since digital tokens have

no jurisdiction, contributors from anywhere in the world can be remunerated with the same currency. Someone in Europe who contributed the same value to a DAO project as someone in India would receive the same remuneration. And because everyone has a fair opportunity to contribute to DAO projects, there may be a rapid redistribution of wealth.

One of the founding principles of the DAO is that all products are open source. The creation of a completely frictionless free market, where the cheapest and best-placed people could contribute mean that toxic companies are starved of labour and customers. Efficient markets coupled with conscientious consumption could spawn tens of thousands of new organisations whose products and services are developed to meet real needs and provide real benefits.

People will be able to work anywhere they want, which could cause mass migration. Digital nomads could force governments to reassess and innovate their policies to attract and retain corporations and talent by reducing taxes, and slackening employment laws. The freedom to work anywhere will cause substantial population shifts, and re-energised communities, with people growing their own food, harnessing natural energy sources, and turning away from mass-produced or packaged solutions. This re-emergence of community after years of isolated self-interest could have a huge impact on happiness levels of all age groups.

Photo credit: Image courtesy of Satalia



Finding the balance between security and technological advancement

Andrew Cameron
Founder and Director, Camanderon Ltd

The rate of technological progress only shows signs of speeding up

It often amazes me how fast the technology sector moves, and how it continues to enhance lives across the world. Just think: it's only ten years ago that we started to use smart phones. Back then, we thought smart home technology was something reserved for techno wizards and that electric cars were simply milk floats. Even Bitcoin was yet to be released. A lot has changed.

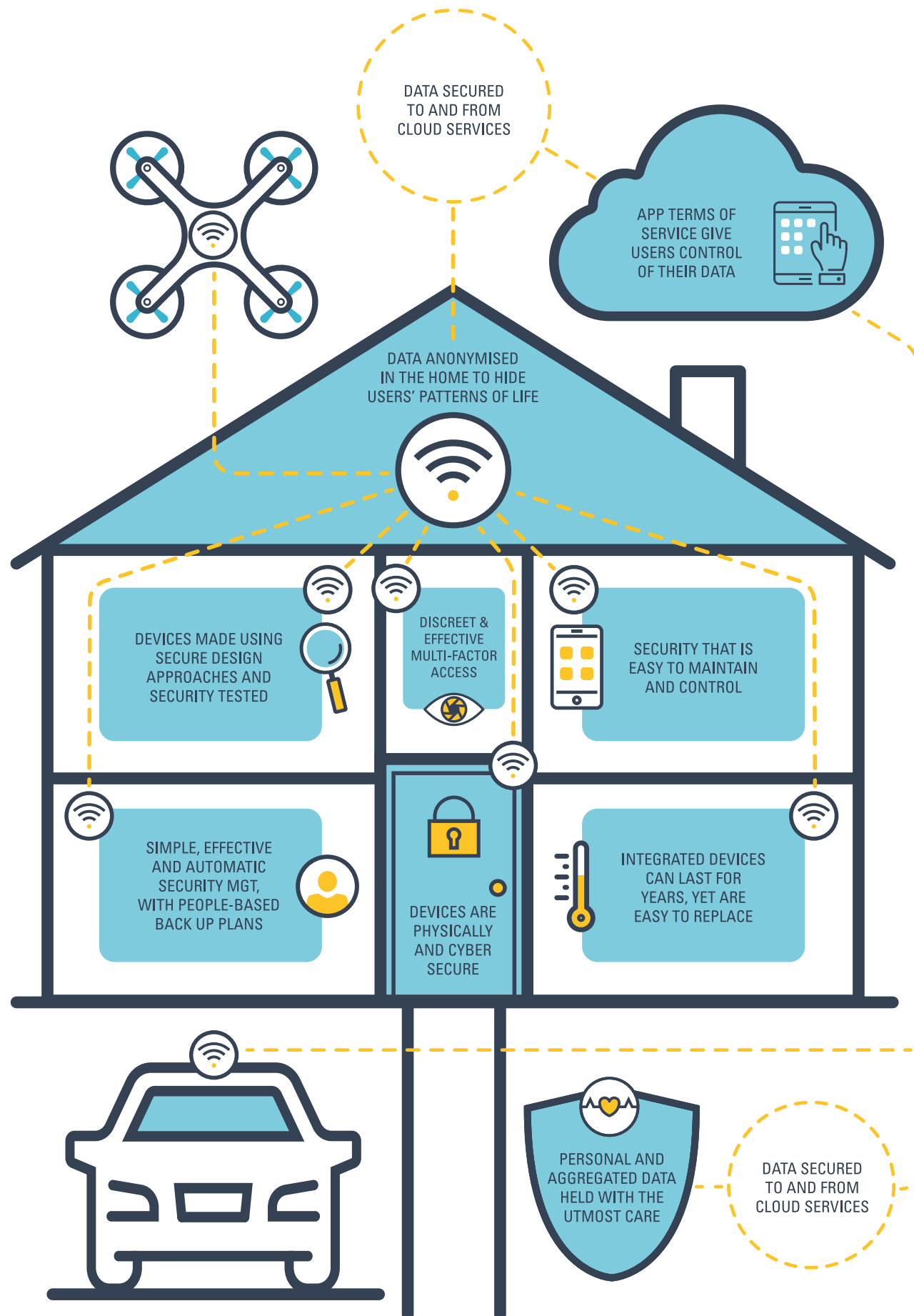
The next ten years will continue to see tech innovation become commonplace. We can expect more personalised digital assistants, greater use of virtual and augmented reality, and autonomous everything. Most of these technologies will be enabled through the Internet of Things (IoT) and various forms of Artificial Intelligence (AI). Many of them will help us to stay in our own home for longer.

However, as well as more readily embracing technology, we now also understand much more about privacy and security. We have had to consider how targeted advertisers are making use of our personal data. We know that cybercrime syndicates steal identities and use ransomware to extract money via our internet connected devices. Numerous high-profile data breaches have affected us all, with businesses now striving for compliance with upgraded data protection legislation. Sadly, with our lack of human 'cyber senses', methods to stop, spot and fix privacy and security issues are only going to become more important.

Immediate cyber security isn't easy

As an IT system builder and advisor on cyber security, I know first-hand how tricky it can be to successfully integrate security. It has to be balanced with cost, functionality, customer expectations, and time to market. For those who have tried, it is fairly straightforward to create a device or service that meets a direct need. However, testing it properly for the many mishaps and attacks that can occur, requires much more effort and funding. As consumers, we must remember that the technology for tech-assisted living advances quickly. It isn't perfectly developed, has numerous vulnerabilities, and will need to be replaced.

That said, I think that steps can be taken to ensure we get the secure products and services we want in our future homes and neighbourhoods. It simply requires each person in the 'neighbourhood system' to think carefully about their interaction with technology, to collaborate to refine their ideas, and to act purposefully.



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Good security and privacy are achievable

There are some security measures that can be achieved now:

Currently, most advertising for security products focuses on the lifestyle benefits, features and price. However, if we want safety for our homes and neighbourhoods, the products and services we buy must consider the security aspect. This should include standards reached, tests performed, and limitations. This will enable better buying decisions to be made.

The Terms of Service (ToS) on too many apps and services give a vague indication of how personal data will be used. Users need to know what personal information is going to be taken and how it will be anonymised; with only the minimum amount of data used to deliver a service. Ideally, I'd like to see the creators of these services write simple 'ladybird-book' style ToS, and clearly indicate how likely changes are going to be. It will then be easier to analyse the risk of integrating those services into our homes and neighbourhoods.

No one can foresee how technologies can fail, and users need to manage their expectations accordingly. That said, I'd recommend several precautions. Use services and devices that come with high reliability, availability and supportability. Ignore 'faddy', short-lived, low-utility, low-security tech e.g. smart toasters and kettles. Consider how much money, time and disruption will take place to replace a smart installation. Lastly, think about having a people-based backup plan or process, just in case the worst should happen.

Developers can enable security at many stages of their devices and services

One of the big security gaps in recent years has been failings to secure the supply chain. We need to know what tests each supply company, and its products/services have undergone. It would also be great if developers could do regular penetration tests, advertising the findings, and making good on any deficiencies.

Developers should also be building IoT devices and services with good security built in, based on a thorough knowledge and experience of cyber-attack methods. Many good technologies already exist that have been tested by the wider technology community. These can be integrated into secure designs.

Most home technology is currently quite basic and doesn't get replaced often e.g. boilers, cookers and thermostats. However, with IoT we should expect to see technology being replaced every 3-5 years, with batteries replaced every year (if not mains connected). Developers need to make sure that devices are easy to replace, and only loosely coupled to the rest of the building systems and Internet of Things. Otherwise, users are likely to continue with out of date devices with their inherent security risks.

Demonstrators can enable us to integrate and test security with functionality

In a world where cyber security skills are in shorter supply than needed, and behaviours towards maximising profit are quite deep rooted, these thoughts may be difficult to achieve. However, NoTF demonstrators will be a great place to test whether these and many other integrated security advancements and behaviour changes are achievable.

Photo credit: Images courtesy of Camanderon Ltd

We can't allow technology to disrupt our legal and ethical frameworks

Karen Holden
Founder, A City Law Firm Ltd

With any advancing technology, we must balance its capabilities with human rights and privacy. By their nature, new technologies tend to be invasive. With an overwhelming volume of data already being generated, failure to properly protect data is an ever growing concern, especially in the context of healthcare. This risk is only going to increase as AI enabled technologies become smarter and more and more personal information is generated. For example, in a smart home using IoT devices, everything from your TV to your fridge is likely to be collecting considerable personal data; from your favourite programmes to how much milk you use or how often you order a particular takeaway meal.

The potential for abuse is growing every day. Anyone designing disruptive technology should be thinking strategically about data protection, beyond the here and now. This is particularly true for any technology designed for the home, and especially the homes of potentially vulnerable people. Product and system designers and their companies should be working with legislators and regulators to ensure the authorities are fully aware of what's coming down the pipeline and how these could affect society. It may even be that the regulators become involved in the design and implementation of new technologies 'upstream', moving to a 'pre-approved' or 'pre-validated' internal operating system.



Failure to properly protect data is an ever growing concern, especially in the context of healthcare.

The times they are a-changin’

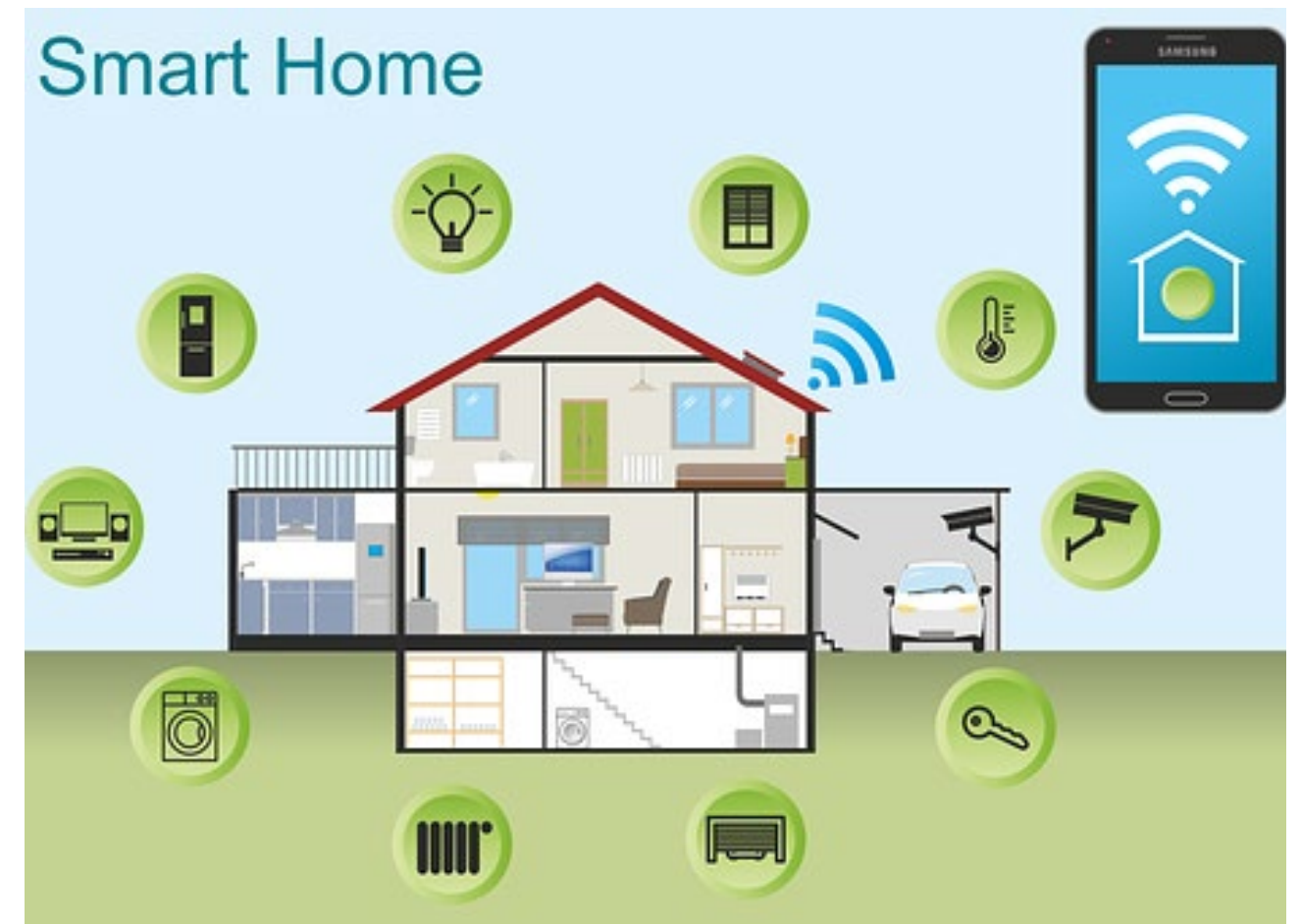
In the UK, the legal system is based on centuries of decisions. Technology, of course, advances much faster than the law. Whilst this is exciting for innovators, it presents challenges for legislators, regulators, and those in the legal profession. This challenge is not new. Whilst it is difficult now to imagine what life was like before we had smart phones, contactless payments and satellite navigation systems, lawmakers have still had to work to adapt to these developments. The same process will continue over the next 10-20 years, as our society works out how to adjust to widespread use of smart contracts, automated vehicles and IOT smart cities and homes.

Considering that it is, by its nature, constantly evolving, the English legal system is surprisingly robust. This is fundamentally because the law is based on a moral and ethical code. Invariably, the starting point is dealing with things which have gone wrong. The ethics of these infringements are inextricably tied to human nature. Whilst the action may be unprecedented, or caused by a new technology, the underlying legal principle can still be completely valid. For example, a contract may still be formed even if this is done using a new form of technology, say your smart fridge! And a nuisance is still a nuisance, even if this is caused by low-flying drones circling over your property.

New models, new challenges

As technologies change, and society with it, there are hurdles that lawmakers, legal profession and technologists will have to overcome. Yet technology itself may go some way to disrupt the role of traditional legal institutions. There may be little need for some offences to be enforced if technology makes that crime impossible to commit. For example, we may see automated vehicles, or vehicles which cannot be controlled by someone over a prescribed alcohol limit, or which will not start unless all passengers are wearing a seatbelt. Further, there may be no need for specific licensing terms if a smart contract prevents a device from operating in contravention of such rights. And certain areas of employment law may become redundant when applied to a robotic workforce.

Another area of law in need of clarity in the 21st Century is ownership. We foresee a rise of the use of digital assets, be that digital music libraries such as iTunes, tokens earned from an online game, or digital currencies like Bitcoin. We should be considering how society can make proper provision for an individual's digital assets within their Wills. We should also recognise that security features, such as passwords, will also need to be transferred to their estates to enable beneficiaries to access such assets. Indeed, it is likely that the whole idea of administering someone's estate will need to change radically.

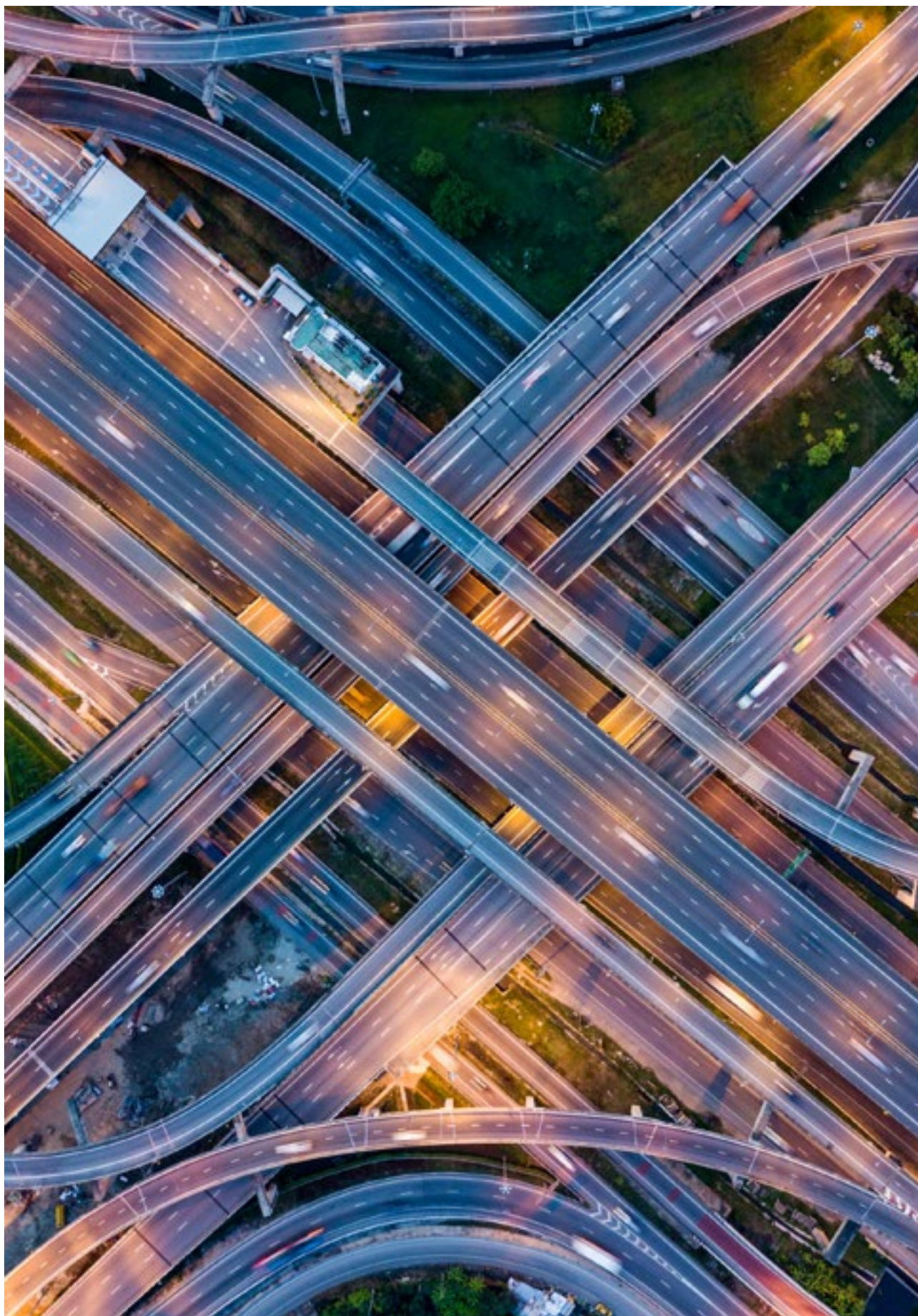


These changes should not be left solely to regulators. The technological innovators should be working in tandem with the authorities to ensure that there are proper provisions for the transfer of digital assets. Technology itself can aid the transmission of an estate. For instance, we could see blockchain replacing a traditional Will. But while there is any human involvement, disputes will still arise, even if the legal landscape looks very different.

The question remains

Whose moral compass will be incorporated into the technology? With large conglomerates controlling the advancing technologies, it is important that some form of human element is retained in this process. Humans will be present in the use of the technology, even if this is simply as the end user. Technology will continue to shape our society. The process of guiding this development into an ethical path should not be left to a single party, be it the developers and owners of the technology, or the legislators. This debate will affect all of our lives, and we must all have a voice in it.

Photo credit: Images courtesy of A City Law Firm Ltd



Smart technology must be interoperable

Robert McLaren

Head of Industrial Technology and Innovation, Policy Connect

Paul Doyle

ACCESS, Research and Development Manager, Hereward College

Interoperability is one of the foundations of our increasingly connected homes and neighbourhoods of the future. It's unlikely that any one company will be able to provide all the technology we will require for our age friendly homes – or that we would want a single developer to have that status. Customers' individual needs and preferences will require a mix and match approach to technology based on individual needs and preferences that shift over time. Devices and products from different developers have to learn to play together.

We come to this issue from two complementary perspectives: practitioner and policy professional. Paul Doyle is manager of the Access Centre at Hereward College, where he leads on assessments for environmental control and telecare, as well as research on user experience and workforce development.

Robert McLaren is head of Industry Technology and Innovation at the cross-party think tank Policy Connect, where he manages the All-Party Parliamentary Group for Assistive Technology.

To see what needs to be done, we look at the interoperability challenge faced by the environmental control and telecare sectors. These established technologies are evolving and have the very real potential to become an integral component of the emergent assisted smart, or cognitive home project. Interoperability practices that begin with the environmental control and telecare sectors can help build a wider infrastructure for interoperability in age-friendly accessible homes.

Business as usual

Environmental control technology allows disabled people and older adults to carry out daily tasks and control their home using a variety of input methods, including eye

gaze, switches and/or voice control. There are a series of NHS specialist commissioning hubs for environmental control that support patients with conditions such as multiple sclerosis and severe arthritis. However, as the technology progresses to form part of the assisted living project, it may be used by a much wider group of people. Environmental control already incorporates and integrates with telecare in many cases, allowing people to call for assistance when needed. Furthermore, as telecare goes digital, it can integrate more deeply with environmental control technology, e.g. using data from environmental control devices to both monitor activity and inform care.

This technology is based on communication between devices, but the use of proprietary protocols is still common, and a resulting lack of interoperability means users often have to 'buy into' an entire product range (controllers and peripherals) from a single developer, rather than mix and match. The environmental control and telecare sectors have seen the development of standards and requirements, but these haven't yet resulted in widespread interoperability. Some standards in this space focus on reliability and safety (see MHRA, Electrical Safety and ISO standards) but don't currently require interoperability. In contrast, open standards for interoperability such as KNX (ISO/IEC 14543-3) haven't gained wide adherence. To understand the challenge, we spoke to several developers and experts in these sectors and identified three key tests for any successful interoperability standard.

Robustness. If we understand robustness to cover both reliability and safety, it is perhaps the most significant challenge. Any interoperability standard that takes away a developer's ability to guarantee reliability and safety for their customers simply won't gain adherents. We asked Philip

Robinson, Managing Director of the assistive technology and telecare developer Possum, how important this is to his business.

‘Everyone who uses environmental control and telecare has their own needs and lifestyle, so no two set-ups are alike. That means the technology has to be flexible and interoperability between devices is a big part of that. We provide personalised bespoke systems for our clients to best serve their needs and lifestyle preferences. But what must remain constant across all the different set-ups is safety. For example, all of our controllers continue to work in the case of a power cut. If you depend upon this technology, it has to work when you need it: reliability is essential for safety.’

It’s true that these systems can be beneficial to a wider range of people, many of whom will enjoy technology as a lifestyle improvement rather than a life or death necessity. For that reason, it can be tempting to regard the kind of robustness that is required by environmental control and telecare as a niche concern within the wider smart homes project. But it is precisely because smart home technology is used to meet such a wide range of needs and preferences that an interoperability standard for the whole sector must be robust. The same user may start with a set-up aimed at convenience and then come to rely on it in more significant ways as they age, adding new elements to their smart-home as they do so. True interoperability would allow for this seamless transition by connecting the whole smart-home market, so the standards we adopt must allow the sections of the market with higher needs to maintain their current reliability and safety.

Consistency. Several environmental control developers have noted that their customers expect products to last many years more than a mere gadget. This can be because of the expense of environmental control and telecare equipment and installation, or because of the disruption to daily living that is caused when even just one item in a set-up needs to be replaced. Dave Gilbert, Director of assistive technology and environmental control developer, Pretorian Technologies explained:

‘The life cycle of retail products is becoming ever shorter and as a result, communications standards for retail environmental controls come and go quite quickly. In contrast, environmental controls for disabled users are expected to have a life cycle which is much longer and be well supported throughout. For this reason alone, we would be very wary of tying ourselves into using retail-oriented wireless protocols. Our priority is to offer support throughout the long-life cycle that our users rightly expect of our products.’

Here again, developers who offer more convenience-focused smart home technologies may have different requirements than those working on environmental controls, but interoperability between convenience and needs-focused technology requires backwards compatibility.

Governance. Interoperability is as much a challenge of collective action as a technical challenge. When a company endorses and uses a standard, they give up a degree of control over their own product development. In return, all their products are enhanced by their interoperability with other smart home devices. For this reason, in order to make the move of adopting a standard, a developer

must have confidence that the standard’s further development will be managed through a governance structure that will continue to be responsive to the needs of their customers. Such a governance structure should therefore be established at the beginning of the process to create the first iteration of the standard, with participation from developers, care professionals, and most importantly of all, older adults and disabled people. In addition, the benefits of adopting a standard are determined in large part by how many others choose to do the same, meaning these other developers’ products are in fact able to work with one’s own. Richard Parry, Head of Global Accounts at technology enabled care developer Doro, explained this by noting that:

‘As the market in smart and self-directed care develops, we have players ranging from global technology companies, like Microsoft, to established SMEs, to start-ups with just a single innovative product. That makes the development and governance of a standard challenging but it also provides the impetus to do it: the diversity of the market has to prove a benefit for consumers, and interoperability is key to that.’

Here again, a governance structure that includes representatives from a wide range of developers is important to inspire confidence that others will adopt, and stick with, the interoperability standard. There are governance models to consider from related technologies, such as Bluetooth and talking books (DASY).

Let’s join the dots now

There is a growing recognition that the environmental control and telecare sectors need to join together to establish intrinsically safe levels of interoperability. The government also has an important role to play in helping the sector develop the infrastructure for interoperability, facilitating the development of standards and shaping policy to encourage the widest possible adoption. To take this forward, representatives of sector bodies including the Institute of Engineering and Technology, the British Standards Institute and international trade associations (CEDIA) are forming a working party to scope for the possibility of new standards in this area. At the policy level, the All-Party Parliamentary Group for Assistive Technology, managed by the think tank Policy Connect, are preparing to take evidence from technology developers and users, for a joint submission to government. These are early steps, but the direction is clear: the environmental control and telecare sectors can make a major contribution to the development of our homes and neighbourhoods of the future by starting now to build the infrastructure for joined-up technology.

A smart home needs a heart

Aditya Mohan
Founder, Skive it Inc

Companion homes

Imagine a home that continuously evolves based on its interaction with you and external factors like the weather. Instead of you telling it what to do, it acts, learns and adapts for your optimal comfort. Your home will not be a monolithic concrete structure, but a set of modular pods (Figure 2), each for a specific purpose. For example, a mobile pod that can drive you to your work or your next vacation (Figure 3). A week-long vacation pod would combine the modular kitchen pod with the mobile pod.

It is your robotic home companion that talks to you, keeps track of your health 24/7, orders your medications, cleans up the home and recommends you ice cream when you come home feeling sad.

Companion Homes will be robotics systems that can move, reconfigure based on seasons or weather patterns and evolve with, and learn from their owner.. It can reorient its location relative to the sun depending on the time of the year to make full use of natural light to warm the house and conserve energy (Figure 4).

Everything in the home will be driven by not just a 'brain' to make the home smart, but a 'heart' to make the home much more like a living robotics system that can sense the home owner and evolves its behavior accordingly on a continuous basis, proactively acting with the goal to maximize your comfort. A Physical manifestation of the home heart is your familiar looking robotic cat that has been with you for last 20 years (figure 6).

Companion neighbourhoods

Companion homes are the key component to companion neighbourhoods (Figure 5) that are not organized by land prices, as there is no concept of land ownership, but instead home ownership with a guaranteed level of comfort backed by insurers.

Towards vision 2030: disrupting the status quo today

Vision 2030 changes fundamentals of how we perceive of homes including construction, ownership contracts and technology, some of which need – and can – take shape today.

Rethinking home construction

The Companion Home units will be organized as modular pods that attached together to form a home. Titanium and high-grade steel will need to be used for construction of pod modules to keep them lightweight, strong and can withstand extreme temperatures that is believed to be common in next 20 years due to global warming. Construction companies should invest in moving away from concrete and wood-based building structures to those made of steel and titanium.

Rethinking home ownership contracts

Today, renting a home is becoming much more popular in large cosmopolitan cities like London and San Francisco. Renting gives the owner the option to move to a new home based on her needs, income and level of comfort needed. The rental agreement is a temporary contract with a time period and price (rent) attached to it. The price is still

dependent majorly on property location with less variability based on the comfort level the home will guarantee in the future.

These temporary 'ownership' contracts can be slowly moved to permanent ownership contracts with guaranteed comfort level with these guaranteed service levels backed by home insurers, large construction companies and state government.

Building the heart of a companion home

The 'heart' of the home is an autonomous neural networked based AI system that connects various IoT appliances in the home including the control systems for the individual pods that make up the home structure. It is designed to evolve through interaction with the owner of the house, just like your cat and dog, learning and acting – as opposed to just reacting – as it knows

you better. At Skive itfi, a UK/US based Deep Learning based startup, we call this autonomous AI, the Robometricsfi kernel. It is a morality layer on top of the AI enabled brain of your Companion Home. We believe that this should form part of any robotics system that interacts with humans and corporations worldwide should accelerate R&D and investment spend on such technologies today that form the AI morality layer.

Imagine what life would be like if you wake up with the sound of the birds and a greeting from your robot companion cat that has been with you for the last 20 years. Won't it be the best moment in the world if your Companion Home can provide you comfort and care when you most need as we all work together to make Vision 2030 a reality?

Photo credit: Image courtesy of Aditya Mohan. Image © Skive it Ltd. **Legal:** Skive it and Robometrics are registered trademarks of Skive it.



Vision 2030 changes fundamentals of how we perceive of homes including construction, ownership contracts and technology, some of which need – and can – take shape today.

User experience: The missing link in technology design

Lee Omar
CEO, Red Ninja Studios

The importance of user experience in design

A child born today will live to the age of 100. Collectively, we are living longer lives, and the baby boomer generation is reaching what was traditionally retirement age. This generation is probably the most consumerist ever. They have bought into digital products and the modern health and wellbeing industry in a big way. This is the generation that bought their music on vinyl, then CDs and now use an iPod or mobile device. They have high standards and are the wealthiest demographic. It is this generation that will drive the market to respond to their needs and design products for ageing that match the UX design of the consumer goods they are used to buying.

Designing the future

Design for the ageing population has traditionally seen an approach of 'you get what you are given'. Think of a mobility scooter or Zimmer frame. These are ugly, functional contraptions with little style. They stigmatise people, perpetuate ageism and basically say 'you're old, frail and past your sell-by date'.

Innovation is needed, with a focus on UX design. But what is UX design? UX is shorthand for User Experience. UX design is the process of designing products that are useful, easy to use, and delightful to interact with. It's a commitment to developing products and services with purpose, compassion and integrity.



As we all grow older, our needs will change, and we will demand products that enable us to live our lives to the full.

It is about anticipating users' needs and giving them something they didn't think to ask for.

UX design is the value a designer delivers at each touch point. Apple are masters at this. Think about the experience you have when buying an Apple product – the packaging, the ease of set up and the downloading of apps. Even when an Apple product is broken, you don't find a fault centre, you visit a 'genius bar' to help fix the problem.

Let's consider the Zimmer frame again. Was this product designed with the customer in mind? Is the user delighted at any point? The answer is no. Now, let's think about the problem this product solves. It is solving the problem of limited mobility. Could this problem be solved in another way, by leveraging UX design? Can we create a wearable solution, for example? Think Wallace and Gromit's 'Wrong Trousers' but designed by Gucci.

Good product designers use design thinking in their approach to new products. Design thinking utilises elements from the designer's toolkit, like empathy and experimentation, to arrive at innovative solutions. By using design thinking, you make decisions based on what future customers really want, instead of relying on historical data or making risky bets based on instinct instead of evidence.

As we all grow older, our needs will change, and we will demand products that enable us to live our lives to the full. The products we need will be aspirational as well as functional. Think iPad rather than stair lift. Products for the ageing society must become mainstream products that have been well designed with UX in mind. Only then can we start to look beyond age and instead focus on living well.

Disrupting the status quo

We need to innovate, not just in terms of technology, but the way the government and the public sector work with the private sector to deliver innovation. Take a look to the US for an example of this. NASA is a federal government agency who famously put a man on the moon, but in recent years their rate of innovation

has stagnated. Traditional rocket companies create rockets that fly into space once and then become space debris that wastes millions of dollars in expensive hardware. Elon Musk's Space X have disrupted this model and have created a rocket that can fly into space and then land back on earth, meaning the rocket can be reused, saving millions. Space X now supply their rockets to NASA. NASA is now working with Uber to create a flying taxi that will be launched in 2020.

How can our public bodies, such as NHS and Ministry of Housing, Communities and Local Government, work with innovative companies to create the homes, neighbourhoods and health systems of the future that work for everybody? Elon Musk understands the importance of UX, this is one of the reasons Tesla and Space X are so successful. We should take the model where disruptive innovative companies such as Elon's become a major part of the supply chain to the public sector bodies, such as the NHS and Ministry of Housing, Communities and Local Government. These companies drive a high-quality User Experience as part of their constant design process. It needs to be easier for companies like this and some of the small, innovative start-ups to work with the public sector to design new products and services that meet the needs of the neighbourhoods of the future.

It's no secret that Silicon Valley companies, on the whole steer clear of health and social care products and services as they find it too difficult to monetise. This is because there is a market failure in major markets such as the US and UK.

The opportunity is for government to address this market failure through industrial strategy and investment that will pump prime more high-risk innovative companies that understand UX. Agile companies that create the products and services that will populate our neighbourhoods of the future. Without this, expect the brightest companies to avoid risk and stick with the safest sectors where they know they can earn a living.

Photo credit: Image courtesy of Red Ninja Studios



A technological utopia?

Professor Theodore Scaltsas
University of Edinburgh

Everything has come alive! It's as if Beauty and the Beast has come true. Mr. Teapot greets me with a cheery 'Good morning!' and chats about the day. Mr. Breakfast-Table is guiding me on what choices to make at my meals that day, while Ms. Fork is recommending smaller bites. Sadly, my Mr. Belt agrees with her, but whispers sweet jokes to cheer me up. You would expect that a mere pinch would see me waking up in my own bed; but no, here I am, in the flesh, two decades hence, in my comfy drawing room in our Neighbourhood of the Future – 2038!

I am Rob, 78, healthy for my age, and I would consider myself active. I read some; watch some; walk some; and also cook, write and talk; yes, talk. Well, cooking is a bit of a challenge, because Maya is so convinced she can do much better than me. It is hard for her to let me take charge in the kitchen – she's so attentive! Watching shows and reading is a challenge – and a surprise! Maya invariably knows better than me what I would like to read or watch, so I let her choose.

Writing has become easier; and not only because all I have to do is speak. It only takes a peep from me and the screen takes off and puts it in the best literary style – I mean, the literary style that the screen knows I prefer. I save for last: walking every day. There, I let Maya take me by the hand. She physically walks me through digital palaces; glorious galas; adventures in the city or the jungle; back to my family home; and even my school. There's little old me at my desk during maths class...

The most wonderful thing is that I don't need to anticipate and direct, but only respond, expressing myself freely. Maya somehow knows instinctively what excites me, interests me. She detects my desires, which I could not tell myself, even if I tried!

What is wellbeing?

We know that it is not 'instinct', or 'intuition' that is informing Maya. Maya is a digital creature, dedicated to the welfare of our Rob. You could say that she orchestrates the lives of all the communicator-gadgets in Rob's household, from the carpet to his comb and shower. They all know everything there is to know about Rob's past, present, and all that can be predicted about Rob's long-term and immediate future. Rob is safe; Rob is protected; Rob is cared for, pampered, even spoiled a little, and Rob is adored by all of them. So, Rob is flourishing.

Rob enjoys his days in the Neighbourhood, which are certainly prolonged by the care and attention he receives in that perfect habitat of the future.

Maya is online with all the monitors in Rob's body, and all the monitors surrounding Rob's body, so that there will never be an unanticipated event to catch them out. They are ready for any contingency, and they like to be one or more steps ahead of Rob's desires. If they sense that Rob needs human companionship, there are a thousand ways in which they can bring him in touch.

Therefore, Rob enjoys his days in the Neighbourhood, which are certainly prolonged by the care and attention he receives in that perfect habitat of the future. Rob has found his home there, his private paradise. He lets himself drift in this heaven, until he withers away into happiness.

No, thank you

I do not want to be a cog in a wellbeing-machine. I do not want to wither away into happiness. I certainly do not believe Maya has any idea of what my welfare is, or my wellbeing. Maya does not experience my sensations; she only measures them. She cannot experience what challenges me, but only record my heartrate. And she can never know what is meaningful to me; not from monitoring my irises, or by my heartrate, or by the activated regions of my brain.

Maya can track the biological machine; but I am a psychological machine, which she can only guess at. Some say there is also the spiritual me, which Maya cannot begin to fathom. Maya's imagination is limited to science, to my history and to my family history, my vital signs, as well as my 'trivial' signs, all of which she finds in human data. These are not who I am, or who I want to be. Maya misses out on one critical item: me. My feelings, my emotions, my experiences – these Maya can only guess at by measuring my body and scanning my brain. But that's not me! I want to do; to accomplish; to create; to make a difference.

If I sound hard to please, do let me clarify. I think of the Neighbourhoods of the Future as the caring machine I can only dream of today. I'd be lucky to be in it. Its commercially developed smart-technology will offer us pleasurable pastimes, much like the way Maya entertained Rob. (Although Rob would have a much firmer grip on the remote control!) However, my future paradise has more dimensions than these – it will also challenge me. My dream neighbourhood should also be an 'Enabling Facility'.

I create, therefore I am

The way the Neighbourhoods of the Future will enable us is by challenging us. This social mechanism has its roots in human evolution. Because our entire biological history has been a series of challenges we faced, rewarding those of us who can overcome challenges turned out to be a successful evolutionary strategy. Put simply, evolution made sure that addressing challenges successfully felt good to humans, so humans would desire to pursue problem resolution.

*'Vienna's Center for Medical Physics and Biomedical Engineering, in collaboration with Goldsmiths University London, has uncovered the secret of the 'Aha!-moment'. When people solve a puzzle through a flash of insight, the mood-enhancing substance dopamine is released and deep-brain structures are activated.'*¹

Dopamine is released in the brain in every instance of problem-solving a person engages with, regardless of the problem's significance and urgency.² The result is the person's experience of motivational intensity, which promotes engagement, determination, and intensity behaviours in the pursuit of goals in present activities.³

Anyone could engage in problem-solving abstractly, just for the sheer high of it. However, older people face real problems themselves, as well as being aware of and concerned about problems that their families and loved ones are facing. And then there are the pressing global issues that reach deadlocks every day. Including the Neighbourhoods' residents in addressing these problems would already be a very desirable reversal of roles that are commonly associated with older people.

Designing our own wellbeing

Yet today, societal factors are preventing this from taking place. The answer is not to leave it to super-intelligent machines to decide and design our wellbeing for us, following on from the way social media is presently redrafting our values for us. What we need, to match super-intelligent machines, is creatively thinking humans. We need to innovatively design our own wellbeing. In my opinion, the Neighbourhoods of the Future should enable its residents to contribute to our society's demand for creative problem-solving. The rewards would be emotional, psychological, and even physical, because of the residents' engagement in activities that are meaningful to them.

No, this does not mean turning Rob into a dopamine addict! Problem-solving and creative thinking do not do this to people. Rob wants and needs a beautiful, caring environment; he is not looking for nice things to do, orchestrated by the commercial streak in Maya. Rob is seeking meaning in his life; he wants to engage, and he wants to make a difference. Rob, like all of us, is crafted by evolution to problem-solve. The stakes are getting higher as we speak, requiring creative solutions in unprecedented contexts, which will captivate Rob's interest, and engross him in the challenges he chooses to take on. This will make Rob fulfilled and creative, with a strong sense of making a difference. We call this meaningfulness, which I really hope my cognitive dream home will facilitate.

The way the Neighbourhoods of the Future will enable us is by challenging us.

Theodore Scaltsas was Professor of Creative Thinking in Philosophy, University of Edinburgh, and is now heading Creativity Crossroads Ltd., which specialises in engagements in creativity. His theory of 'BrainMining' is published by the Harvard Business Review

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Photo credit: Image courtesy of Theodore Scaltsas