BACK TO THE FUTURE

Self-Driven Healthcare (SDH) 2030

Insights Report

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SDH Ecosystems Hub

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THE FUTURE IS ALREADY HERE

Outline

Foreword

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Non-communicable diseases (NCDs) are a growing global health concern, responsible for 71% of all deaths worldwide (WHO, 2021). NCDs, & so-called 'diseases of the lifestyle' including conditions such as obesity, cardiovascular disease, type 2 diabetes & some types of cancers, are responsible for a significant burden of disability, reduced quality of life & premature mortality worldwide.

Self-care & Self-Driven Healthcare (SDH) have emerged as important strategies for addressing the burden of NCDs. While self-care refers to the actions that individuals can take to maintain & improve their own health (e.g., healthy eating, physical activity, etc.), Self-Driven Healthcare (SDH) is an umbrella term initially proposed by Innovate UK to conceptualise aspects of healthcare delivery that can support people in becoming more engaged in their own health & wellbeing management rather than being passive receivers of healthcare.

The SDH approach involves individuals taking a more active role in managing their personal health & wellbeing journey, such as by using technology to monitor & track their health status & engaging with healthcare providers to make better-informed decisions about their care. Digital health technologies, such as wearable devices & mobile health apps, can help individuals monitor & track their health status, identify early warning signs of disease & manage chronic conditions more effectively. For example, smartphone apps that track physical activity can help individuals set goals & monitor their progress towards meeting them, whereas patients with diabetes who use digital health tools to monitor and manage their condition are more likely to achieve better glycaemic control & have fewer hospitalisations than those who do not use these tools. Crucially, SDH also has the potential to address health disparities by democratising access to self-care interventions & improving access to healthcare for underserved populations.

The development of cross-cutting SDH presents a real opportunity for the UK to build and grow companies with a large international market, & to become a global leader in the SDH landscape & knowledge economy. To address this call to action from Innovate UK, Quantifique (QNT*f*Q) was established specifically to help unlock the potential of SDH by accelerating the development, adoption & diffusion of cross-cutting SDH solutions for public & patient benefit. Our work has led us to develop the case for an SDH portal – an online solution which we hope will transform how people can engage with their personal health & wellbeing journey, deliver healthcare & positively impact people's lives.

For the UK to remain competitive in the SDH landscape, we propose that national funding agencies invest in establishing a National SDH Ecosystem Hub that would commission the development, implementation & piloting of the proposed SDH portal by 2030. This report highlights the enormous potential of self-care (a topic we cover in the Self-Care 2030 sister report & Self-Driven Healthcare to transform the healthcare system & improve patient outcomes. While there are challenges to be addressed, the opportunities are too great to ignore. The report concludes with a call to action for stakeholders to work together to make Self-Driven Healthcare a reality. 2030 may seem like a long way away, but the future is already here!

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What Does The Future Look Like For Health & Wellbeing?

In the not-too-distant future, we may live in a world where self-care enthusiasts have access to a seamless & futuristic healthcare delivery system. To see how this could play out, meet Sarah, a tech-savvy individual who takes charge of her wellbeing through self-care practices. Sarah has a subscription to a cutting-edge healthcare service that uses advanced technology, including autonomous drones. Drones flying overhead is very common these days.

One morning, Sarah wakes up feeling a bit under the weather & realises she needs over-the-counter (OTC) medicines to alleviate her symptoms. Without skipping a beat, she opens the *Self-Driven Healthcare* (SDH) app on her smartphone. She is met with an AI chatbot that has been keeping track of her vital signs (blood pressure & heart rate from the smartwatch) & physical activity levels. It knows how old Sarah is, how many steps she walks on average every day & a lot more.

Sarah talks casually to the chatbot & describes her symptoms. The chatbot then identifies some likely conditions Sarah may be experiencing. The app analyses her symptoms & recommends the appropriate OTC product to address her specific needs.

Within minutes, Sarah receives a notification that her order is being prepared for delivery. She walks out onto her balcony & gazes up at the sky, where she sees a swarm of sleek, intelligent drones soaring gracefully. These drones, equipped with advanced sensors & navigation systems, are designed to transport products safely & efficiently to consumers. One of the drones, precisely identifying Sarah's location through GPS coordinates, descends near her balcony. It carefully lowers a package containing the OTC medicines, ensuring a gentle landing. Sarah receives a notification on her smartwatch, confirming the successful delivery.

Impressed by the efficiency & convenience of this futuristic healthcare delivery system, Sarah unpacks the OTC medicines, scans the QR code & reads the accompanying instructions on her digital device. She appreciates the user-friendly interface, which provides clear guidance on dosage, potential side effects & any necessary precautions. As Sarah takes her medication, she reflects on how technology has transformed the self-care landscape. With the integration of drones, artificial intelligence & advanced logistics systems, individuals like her can access necessary healthcare products quickly, without the hassle of visiting a physical store or waiting for delivery trucks.

This futuristic scenario not only highlights the potential of technology in improving accessibility & convenience for self-care enthusiasts, but also underscores the importance of responsible use & adherence to recommended guidelines. As technology continues to advance, empowering individuals to take control of their health, the future of self-care embraces a harmonious blend of innovation & personal wellbeing.

Welcome to the future!

While the concept of a seamless & futuristic healthcare delivery system showcased in this scenario may seem promising, it also raises concerns & potential drawbacks. For example, relying heavily on technology & AI chatbots for self-diagnosis & treatment recommendations can be risky. AI algorithms may not always accurately identify conditions & symptoms, & this could lead to misdiagnosis or inappropriate medication recommendations. The absence of human medical professionals in the process also removes the crucial aspect of personalised care & human judgment, which can be essential in certain situations. Over-reliance on digital first interactions may also lead to feelings of loneliness & social isolation. Additionally, the heavy reliance on drones for product delivery raises concerns regarding privacy, security & collecting personal data, such as GPS coordinates & vital signs, which could potentially be misused or compromised, posing a threat to individuals' privacy. This scenario also assumes universal access to advanced technology, which may not be the case for everyone, creating a potential digital divide in healthcare accessibility. Thus, while the integration of technology in healthcare delivery holds promise, caution must be exercised to ensure accuracy, privacy & equitable access for all individuals. People may be also concerned that SDH may being about the privatisation of the NHS, but this will not be true if SDH remains focused on areas such as prevention & better health which the NHS doesn't pay for now & have always been the responsibility of people when looking after themselves.

2 Self-Driven Healthcare For A Super Smart Society

The landscape of healthcare is rapidly evolving, driven by the latest trends & advancements in technology. The future of health & wellbeing in 2030 will be shaped by these changes, with a focus on personalised healthcare services & the empowerment of individuals. As we move into a new era, Self-Driven Healthcare (SDH) solutions offer a ground-breaking approach that puts individuals at the centre of their own health & wellbeing journey.

SDH is an umbrella term that describes self-care with technology. It encompasses various aspects of healthcare delivery that promote active engagement & self-management. SDH leverages technology & self-generated data to provide tailored healthcare services that meet individual needs, aiming for a more efficient & accessible healthcare system.

Looking ahead to 2030, we anticipate a healthcare system that is truly patient-centric. Artificial intelligence (AI), big data & wearables will enable healthcare providers to deliver highly personalised care, while remote monitoring & telemedicine will bridge the gap for individuals in rural & remote areas. See our paper published in the *Journal of the Royal Society of Medicine* for more information.

Our ever-increasing reliance on technology is also leading us to what futurists are referring to as **Society 5.0** – a society that is dominated by the pervasive use of AI, autonomous drones, nanotechnology, 3D printing, the Internet of Things (IoT), blockchain & genetic engineering (**figure 1**). All of these will greatly influence how healthcare is delivered & how we care for ourselves.

'Self-Driven Healthcare (SDH) is an umbrella term, initially proposed by Innovate UK, to conceptualise aspects of healthcare delivery that can support people in becoming more engaged in their own health & wellbeing management rather than being passive receivers of healthcare.' [1]

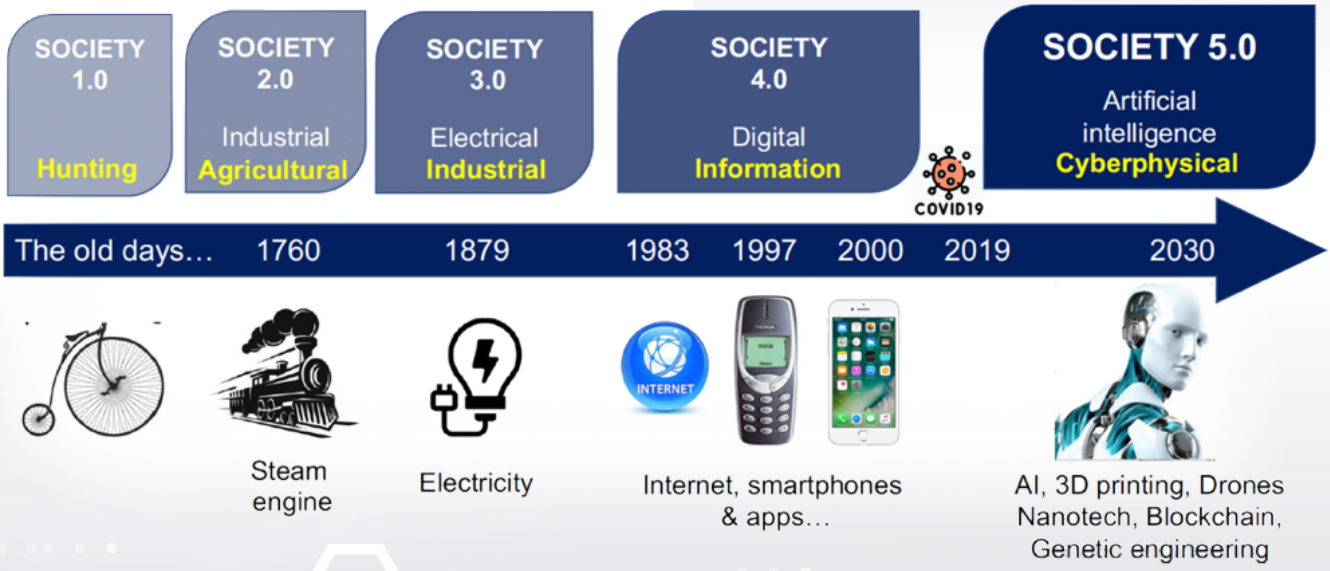

Figure 1: The emergence of Society 5.0, which will be dominated by the pervasive use of AI, nontechnology, autonomous drones & genetic engineering.

Self-Driven Healthcare In The Context Of Society 5.0

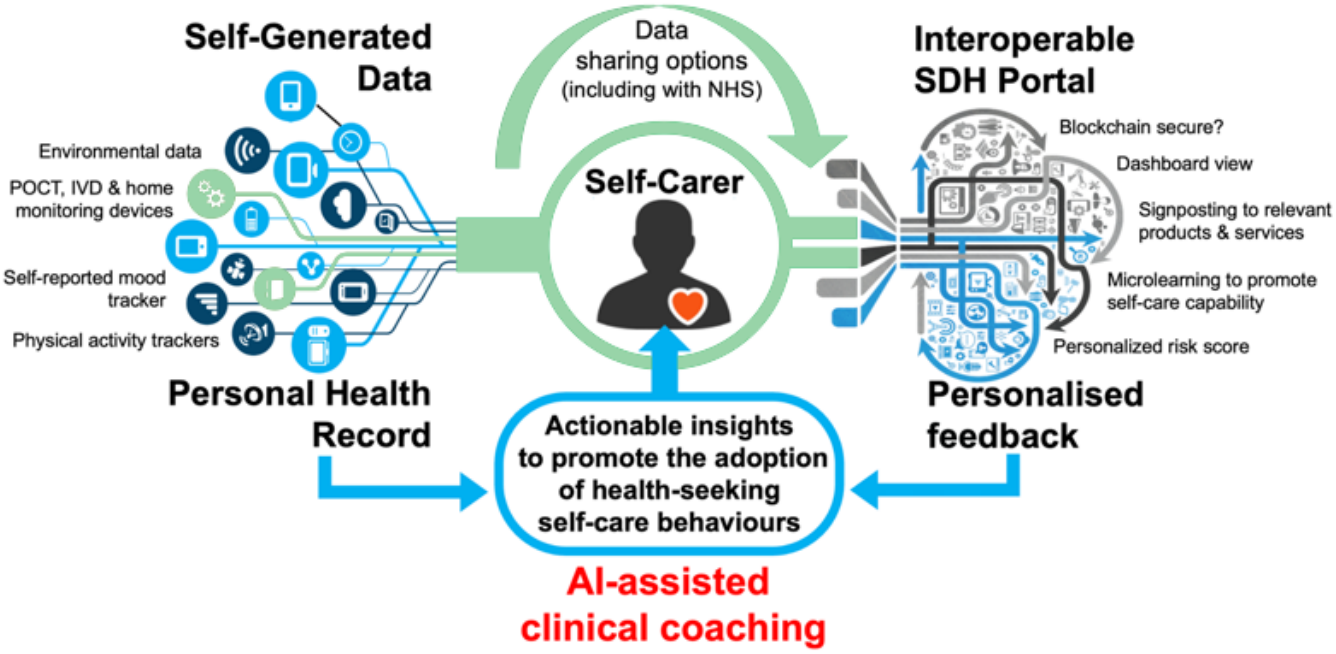

Figure 2: Schema showing the ideal characteristics of SDH portal
Self-generated data could be shared by the individual 'self-carer' (who could be a healthy person or a patient), to a secure SDH portal. The SDH portal will have added functionality & could provide personalised feedback & actionable insights to empower the self-carer & promote the adoption of health-seeking self-care behaviours.

Self-Driven Healthcare (SDH) is an empowering approach that enables individuals to take charge of their health & wellbeing using technology & data. It will be a defining feature of how healthcare is delivered as we embrace Society 5.0. It involves the use of personalised health data, wearables, mobile applications & other digital tools to enable individuals to manage their own health.

The SDH approach is facilitated by building a more personal & private healthcare infrastructure around people using consumer-focused monitoring & diagnostic tools connected to online portals. The vision for SDH is that these personal healthcare management systems are then integrated into the wider healthcare system including the NHS, thus supporting better online interaction with healthcare professionals & improving the exchange of information, such as personal healthcare records & self-generated data. Many of the component parts of the SDH approach are already in place, but the implementation of a complete & viable SDH system seems to be stalling, despite the participation of big tech firms such as Google Health, Microsoft HealthVault & NHS Health Space.

A desirable SDH solution will support activated individuals in taking more control of their health and wellbeing journey by helping them record their own data (e.g., weight, blood pressure) using a phone app, tablet, personal computer or Bluetooth device. This self-generated data may be stored in a blockchain-secure online portal (**figure 2**) which would hold all their health records, including those generated in the wider healthcare system. In this scenario, activated individuals would also enter other data such as the medication taken during the day, the food eaten, or the exercise they had done. They may even have a range of other devices that automatically record & upload useful information, such as environmental data about local air quality that day. The online SDH portal would offer a personalised dashboard that would automatically present the user with their 'digital twin'. The SDH portal may also be enabled to routinely provide insights & actionable advice to the self-carer, including microlearning & behaviour change interventions & a holistic picture of the person's overall health & wellbeing status. A desirable SDH ecosystem would facilitate better self-care & management with an emphasis on maintaining health & not just treating illness (9). This approach would also improve early (pre-symptomatic) detection of disease by warning if a significant change in healthcare status was identified, perhaps using AI-powered online diagnostic tools.

4 Making The UK The Best Place In The World For SDH

With the world's ageing population experiencing a growing epidemic of NCDs & so-called 'diseases of the lifestyle' it has become increasingly clear that traditional healthcare approaches are no longer sufficient to address the challenges we face. SDH offers a potential solution by promoting citizen engagement & streamlining access to evidence-based self-care interventions.

The development of cross-cutting SDH solutions could help accelerate the delivery of the NHS Long Term Plan's 'Ageing Society' grand challenge area to support people to age well in the community, the 'Making Better Use of Data and Digital Technology' strategy, & the 'Joining up care for people, places & population' white paper.

Developing cross-cutting SDH solutions means creating an ecosystem of tools, technologies & interventions that can help individuals take charge of their health & wellbeing. This approach involves integrating various aspects of healthcare, such as prevention, early detection & management, into a seamless, holistic experience that empowers people to make informed decisions about their health. By leveraging the latest advances in digital technology & data science, SDH solutions can provide personalised, evidence-based guidance & support that can help prevent chronic diseases, manage existing conditions & promote healthy living at all stages of life. Cross-cutting SDH solutions can also help bridge gaps between healthcare providers, patients & communities by fostering greater collaboration, transparency & accountability, while promoting the adoption of best practices & standards across the healthcare ecosystem. One idea involves the development of an SDH portal that could be used by healthy individuals, consumers of health technology products & patients across a variety of settings to promote personal empowerment & individual self-care capability.

SDH also presents a significant opportunity for governments to improve health outcomes while controlling costs & addressing priority areas such as equity, diversity, inclusion & levelling up. Becoming the best place for SDH means attracting investments, fostering innovation & creating an environment that nurtures technological advancements & patient-centric care. By seizing this opportunity, the UK can not only improve health outcomes & control costs, but also become a beacon of innovation – setting the standard for personalised, accessible & sustainable healthcare worldwide. The future of Self-Driven Healthcare starts here, in the UK.

The UK government has already taken steps to support the development of an SDH ecosystem, with initiatives such as the NHS App & the NHS Long-Term Plan. In addition, the UK has a highly developed digital infrastructure & a thriving technology sector, which will be crucial for the success of the SDH portal. This makes the UK well-positioned to develop & implement a National SDH Portal by 2030, & to become a world leader in Self-Driven Healthcare.

CASE STUDY

What is the UK readiness to establish National SDH Portal by 2030?

Over the course of 6 months (1 Nov 2022–30 April 2023), QNT*f*Q engaged with a wide mix of stakeholders, including members of the community, policymakers, NHS managers, academics, technologists & industry leaders to identify the desirable characteristics of a National SDH Portal to support people in playing a more active role in their health & wellbeing journey. We then sought to identify the UK readiness to establish such a portal by 2030.

The success of the proposed SDH Portal will be determined by its ability to engage stakeholders, promote effective SDH solutions, improve health outcomes & positively impact people's lives. Building a cross-cutting SDH solution that would be used by a large segment of society would require collaborative working between a wide mix of stakeholders (e.g., NHS, industry, charitable organisations, academia, research, etc.), & breaking down many siloes. It would also require significant investment & coordination. For the UK to remain competitive in the SDH landscape, QNT*f*Q proposes that the UK invests in the creation of a National SDH Ecosystem Hub that would commission & oversee the development & launch of a national SDH Portal by 2030 timeline.

Two ingredients are needed to make SDH Portal a reality: (1) funding & (2) establishing a national SDH ecosystems hub. The National SDH Ecosystem Hub would ideally be a consortium of industry & technology SMEs, NHS organisations, academic/research partners & health research infrastructure (e.g., NIHR) & charities (e.g., MRC Wellcome Trust). These partners would bring a range of skills & expertise including research & development, data science, medical education, policy guidance & funding.

Overall, the UK is well placed to spearhead the development of a National SDH Portal. More work is needed to ensure that any proposed initiative will remain sustainable after an initial investment from investors & funding agencies.

The Social & Financial Return On Investment Potential Of SDH

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Beyond the realm of futuristic gadgets & buzzwords, SDH represents a transformative force with immense social & economic return on investment potential that makes it a game changer for individuals, societies & economies.

SDH is about putting the power of health management into the hands of individuals. It empowers people to actively engage in their own care, becoming partners rather than passive recipients. By providing personalised tools, digital platforms & real-time health data, SDH enables individuals to make informed decisions, monitor their progress & adopt preventive measures. This empowerment fosters a sense of ownership, responsibility & agency over one's health, leading to improved wellbeing, reduced healthcare costs & an enhanced quality of life.

The potential of SDH to revolutionise health outcomes is also unparalleled. By promoting early detection, proactive intervention & personalised care, SDH has the power to prevent or mitigate the impact of chronic diseases, reduce hospitalisations & improve overall health outcomes. Through continuous monitoring, AI-powered diagnostics & targeted interventions, SDH can transform healthcare from a reactive approach to a proactive & preventive one. This shift not only improves individual health but also alleviates the burden on healthcare systems, allowing resources to be focused where they are most needed.

SDH mitigates the strain on healthcare budgets by encouraging self-care practices, reducing unnecessary hospital visits & optimising resource utilisation. The seamless integration of technology & data could streamline healthcare processes, eliminate redundancies & improve coordination among care providers. This leads to cost savings, increased operational efficiency & the ability to redirect resources to areas that require attention, ultimately creating a sustainable healthcare system.

Investing in SDH is not just about transforming healthcare – it's about driving economic growth & job creation. The development, implementation & scaling of SDH solutions require a thriving ecosystem of innovative companies, skilled professionals & supportive policies. By fostering an environment conducive to SDH innovation, countries can nurture a burgeoning industry, attract investments & create high-quality jobs. The SDH sector spans technology development, data analytics, digital platforms, telehealth services & more, ultimately generating economic value & contributing to overall prosperity.

One of the most promising aspects of SDH is its potential to promote health equity & bridge existing gaps in healthcare access. By providing personalised, accessible & culturally sensitive healthcare solutions, SDH reaches underserved populations, remote areas & vulnerable communities. Digital platforms, telemedicine & remote monitoring can overcome geographical barriers & connect individuals to essential healthcare services. SDH also empowers individuals who face social determinants of health, addressing disparities & fostering a more inclusive healthcare system.

In this regard, SDH is not merely a technological advancement, but a catalyst for a healthier, more resilient & equitable society. As we embark on this transformative journey, let us seize the opportunities presented by SDH & unlock a future where empowered individuals shape the course of their own wellbeing. Together, we can unleash the true potential of Self-Driven Healthcare & create a healthier world for all.

6 Considerations For A Super Smart Society

As we move towards a super smart society, there are several key considerations that need to be regarded. These include data security & privacy, accessibility & the ethical implications of new technologies. For example, while online patient access to health records is intended to help patients, in some cases being able to view one's health record can have negative consequences. This can include when patients discover surprising & distressing information or find their health information difficult to interpret.

Promoting digital literacy and health literacy among individuals is also vital to empower them to effectively navigate & use Self-Driven Healthcare tools and resources (see our Self-Care 2030 sister report for a deep dive into Heath Literacy Pillar). Whereas this could be achieved using education & awareness programmes to enhance individuals' understanding of health information, technology usage & responsible self-care practices, as technology advances & society becomes more digitally connected, there is also a risk of exacerbating inequitable access to & proficiency in new technologies. This may disproportionately benefit certain groups, leaving marginalised populations further behind & potentially widening the digital divide.

The SDH approach & Society 5.0 envision a highly interconnected & technology-driven society & rely heavily on data collection, analysis & sharing. While this may offer numerous benefits, it also raises concerns about overreliance on technology & the potential consequences of system failures or disruptions. This necessitates the development of safeguards & contingency plans to mitigate the risks associated with dependency on technology.

As Society 5.0 integrates technologies like artificial intelligence & the Internet of Things, these ethical considerations become paramount. Ensuring that AI algorithms are transparent, fair & unbiased is crucial to prevent discriminatory outcomes. Striking the right balance between technological advancements & ethical principles is paramount, including embedding mechanisms that maintain individual autonomy & informed consent.

Overcoming the risks and negative considerations of Self-Driven Healthcare & Society 5.0 requires acknowledging the challenges ahead. However, history has shown that humanity has an innate ability to adapt & find solutions through collective efforts & innovative thinking. With responsible governance, we can navigate change, address concerns & shape a future that benefits individuals & society. Looking ahead to 2030, we can expect Self-Driven Healthcare to have a transformative impact on the healthcare landscape where advances in technology & data will enable us to deliver more personalised & targeted care, while also enabling individuals to take control of their own health & wellbeing.

As we navigate this transformative era, it is essential to strike a balance between technological progress & human wellbeing. Ethical considerations, privacy concerns & the need for equitable access to healthcare must be addressed, whereas adopting a human-centred design approach & meaningful societal engagement & participation will be crucial to ensure traction with end-users & that the needs & perspectives of users are taken into account at all stages.

Back To The Future

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Our ever-increasing reliance on technology & the emergence of Society 5.0 & Self-Driven Healthcare solutions will transform how people will manage their own health & wellbeing journey. This will in turn provide tremendous benefits & value to individuals, the community, healthcare providers & health systems in the form of the improvement of population health.

'Given the pervasive use of technology, developing person-centred SDH solutions that people like & want to use can help democratise access to self-care products, services & interventions, & can help make self-care everybody's business.'

Today and in the future, SDH solutions offer the potential to revolutionise the healthcare industry & support individuals in leading healthier, more fulfilling lives. By leveraging digital technologies & promoting citizen engagement, SDH ecosystems can streamline access to evidence-based self-care interventions, ultimately leading to improved health outcomes & cost savings for health organisations & governments.

The development of cross-cutting SDH solutions is a vital next step towards achieving the NHS Long Term Plan's 'Ageing Society' grand challenge area, & to making better use of data & digital technology, & helping deliver joined-up care for people, places & populations. With the right investments & strategic partnerships, we can create a brighter, healthier & more equitable future for all. In the end, a super smart, super connected Society 5.0 & pervasive use of SDH solutions may bring about significant cultural & social changes that could impact societal norms, interpersonal relationships & personal wellbeing, making it crucial to anticipate & address these changes & ensure that the benefits of technology align with human values, social cohesion & individual wellbeing.

Today, we may look at emerging concepts of Society 5.0 & Self-Driven Healthcare as a glimpse into tomorrow. But in reality, the future is already here!

About QNT*f*Q & the Self-Care Academic Research Unit (SCARU)

QNT*f*Q

Quantifique (**QNT*f*Q**) is an early-stage social impact start-up founded in 2022. The technology SME is specifically dedicated to supporting the development of the SDH agenda in the UK & internationally.

QNT*f*Q's vision is to help unlock the potential of Self-Driven Healthcare for people and patient benefit

QNT*f*Q's mission is to make the UK the best place in the world for Self-Driven Healthcare

With the help of grant funding from Innovate UK and constructive engagement with stakeholders, **QNT*f*Q** is developing thought leadership on how to create a sustainable SDH business model that addresses the needs of patients, healthcare providers & the wider community.

SCARU

Imperial SCARU was established in 2017 & to date remains as the only university academic research unit dedicated to the study of self-care.

SCARU's vision is to be the leading academic base for self-care

SCARU's mission is to make the absolute case for self-care

SCARU will achieve this by identifying and studying the ways in which individuals, communities, policy makers & governments can apply self-care to improve health & wellbeing using self-care & lifestyle medicine approaches througout the lifecourse & across different settings.

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