Transforming lives
The Internet of Things is at the heart of a digital healthcare revolution
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A system under strain

Increasing demand, rising costs, pressure to innovate — the healthcare sector needs to adapt to maintain current levels of care.

Mounting concerns across the ecosystem

Whatever role you play in the healthcare ecosystem, one thing is clear: the industry's ability to deliver effective care is under huge strain.

Globally, better informed populations seeking healthcare services are growing fast, outstripping the availability of trained staff — and those in need may be far from the nearest hospital or clinic. How can you make limited resources go further?

The cost of managing ageing populations and the increasing prevalence of chronic conditions is putting payers and governments worldwide under considerable pressure. How can we reduce the impact of long-term care needs on the healthcare infrastructure and how can individuals be empowered to manage their well-being?

Concerns about drug effectiveness, emerging new threats like the Zika virus and the enormous cost associated with drug development continue to put the industry under strain. How can you innovate more quickly and efficiently, outpace the revenue shortfall from expiring patents, and adapt to new models, such as value-based pricing?

Preventative care and the sharing of meaningful data potentially hold the key to easing the strain on the system. And empowered patients are ready to take the lead. How can the healthcare sector pivot from delivering treatment to supporting wellness, adapt to the demands for health information exchange and utilise the benefits of big data analytics for the population as a whole?

IoT: powering the connected health revolution

The Internet of Things (IoT) is crucial in answering many of these questions.

IoT technology makes it possible to connect assets of all kinds — everything from heart monitors and fleets of vehicles to chiller cabinets. These assets are equipped with sensors that monitor their environment, and with a network connection so they can communicate. IoT is enabling individuals and businesses to collect data in real time, supporting their decision making.

For example, IoT is powering connected medical services. These enable healthcare professionals to diagnose and consult with patients and first responders remotely, no matter where they are, improving access to care. Connected digital services also empower the vulnerable and patients with chronic conditions to undertake routine care and treatment in the comfort of their homes, enhancing independence, avoiding the disruption of hospital visits and improving outcomes.

Using IoT, pharmaceutical companies can gather better clinical trial data, speeding up new drug development. They can monitor shipments of expensive, temperature-sensitive drugs, avoiding the steep financial penalties associated with theft, spoilage and regulatory non-compliance.

And IoT is the technology behind innovative wellness products, such as wearable fitness monitors, sleep sensors and connected scales, that can feed data into the next generation of analytics platforms to deliver new healthcare insights.

The size of the global digital health market is expected to increase to $233 billion by 2020.[1]

Opportunities across healthcare

The IoT opportunities in healthcare are immense. So it's no surprise that 89% of healthcare organisations said that IoT will be "critical" for their future success.[2] And those that already use it are seeing strong results. Two-thirds of healthcare organisations that have adopted IoT have already seen "significant" return on investment.[3]

How healthcare stakeholders benefit from IoT

Patients are empowered and achieve better health outcomes. They get faster diagnosis and treatment, based on more accurate data, with minimal disruption to their lifestyles, and at a lower cost. And IoT is helping vulnerable people, such as the elderly, live more independently in their own homes for longer.

Healthcare providers can radically improve the quality of patient services, while avoiding the cost of admissions and easing the burden on overworked staff. IoT can also help these organisations run day-to-day operations more efficiently.

Pharmaceutical and contract research organisations gather more and better data during clinical trials, and enable innovative new ways of pricing treatments, particularly by aligning cost to individually measured clinical outcomes. IoT can also drive efficiencies through manufacturing and supply chain operations.

Medical equipment manufacturers build IoT connectivity into a vast array of medical devices, such as blood glucose monitors for remote management of patients with diabetes, or battery sensors that ensure defibrillators are ready when needed.

Pharmacies use smart devices to automate prescription refills, avoiding delays and dosing errors. Smart pill boxes in the home can remind patients to take medication and track compliance with prescriptions.

Governments and industry bodies use large-scale data sets gathered by IoT to analyse treatment effectiveness, track the spread of diseases, and understand macro trends in population health, to guide policy decisions.

Insurance companies and payers gather a new level of information about patients and their health, to deliver new services while managing their company's exposure to risk.

1.7 billion mobile device users will have downloaded a health app by 2018.[4]

Healthcare IoT in action

Vodafone's IoT solutions are already delivering proven results across the healthcare sector, in four key areas.

1. Remote monitoring: saving lives and time

Routine hospital visits are costly and time-consuming for both doctors and patients. IoT-powered remote care solutions are the answer.

Remote monitoring enables doctors to consult and review real-time patient data, reducing emergency admissions and the number of home visits and appointments needed. Patients are empowered to get on with their lives; clinicians can see more patients each day, and quickly involve specialist colleagues around the world to consult on challenging cases.

Remote monitoring is transformative in rural or emerging markets where healthcare services may be limited or doctors may be far away. And it's ideal for conditions such as sleep apnoea, where compliance data may be a regulatory requirement — as well as other chronic ailments, such as diabetes, heart disease and respiratory problems that require ongoing intervention.

This is a fast-growing market, with spending on remote patient monitoring set to reach $26.4 billion by 2019.[5]

By 2040, **642 million** people will suffer from diabetes.[6]

Diabetacare monitors diabetes with IoT

Diabetacare is using Vodafone's IoT technology to improve the lives of patients with diabetes. By supplying patients with connected monitoring devices, Diabetacare is helping improve their diabetes management. The devices send information — blood glucose levels and blood pressure — to clinicians who adjust medication and provide guidance remotely. This enables clinicians to improve diabetes management and adjust medication, without seeing the patient in clinics.

2. Independent living: staying self-sufficient and safe

For many of us, the smart home is all about convenience, energy efficiency and security. But it's transforming health and social care too.

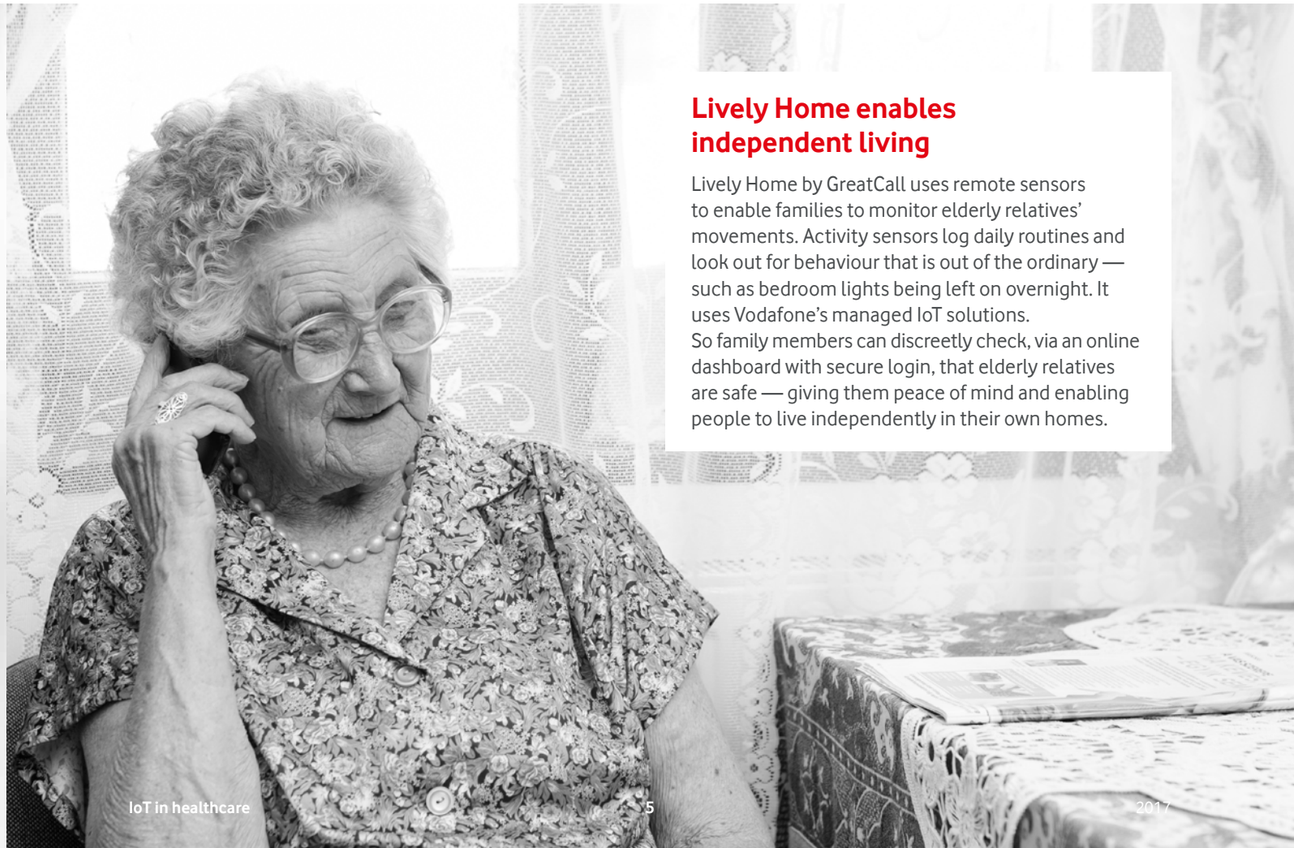
Millions of people around the world are vulnerable, for example, the elderly and those who live with a chronic condition such as dementia. The number of people with dementia is forecast to reach 75 million by 2030[7].

They can be at risk when living alone, but moving to residential care is not always desirable or affordable.

IoT-powered assisted living solutions bridge the gap, enabling people to live independently in and out of their homes for longer with more peace of mind.

These solutions use sensors and wearable devices to keep an eye around the home to reduce hospitalisations and future health spend: they can sense when a person suffers a fall, spot deviations from usual patterns of behaviour that might indicate a problem and remind patients to take their medication as prescribed.

By 2018 there will be **19 million** connected monitoring devices in homes.[8]



Lively Home enables independent living

Lively Home by GreatCall uses remote sensors to enable families to monitor elderly relatives' movements. Activity sensors log daily routines and look out for behaviour that is out of the ordinary — such as bedroom lights being left on overnight. It uses Vodafone's managed IoT solutions.
So family members can discreetly check, via an online dashboard with secure login, that elderly relatives are safe — giving them peace of mind and enabling people to live independently in their own homes.

3.Supply chain:
more efficient and secure

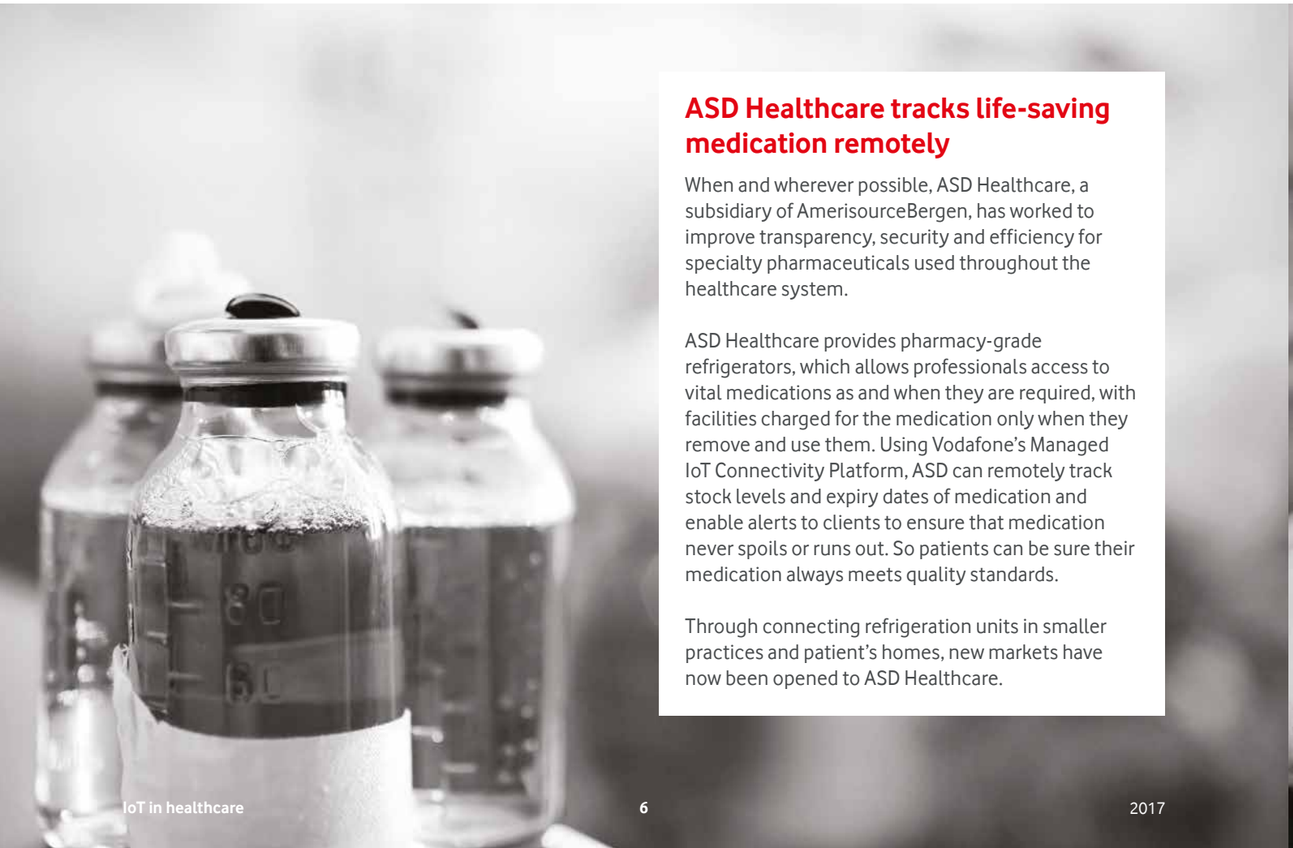
Ensuring product integrity and security throughout the supply chain has always been a high priority for life sciences and healthcare service providers. Product portfolios evolving towards structurally more complex biotechnology drugs, stricter regulations, extended geographic coverage, increasing risk of theft and intense cost pressure are significantly raising the stakes. IoT can help.

Tracking devices and sensors in containers, warehouses, trucks and on employees, enable organisations to monitor the movement of expensive, time- and temperature-sensitive products in real time from drug development all the way through to the patient.

IoT helps mitigate supply chain risks and enables corrective action to be taken in the event of a problem. A single consignment lost due to a temperature excursion or theft may be worth upwards of $50 million.[9]

IoT can also improve medication adherence, where connected medicine cabinets automate prescription renewals. And remote monitoring of medical equipment ensures it is ready to use when needed.

Healthcare companies will spend **$13.4 billion** on cold chain logistics by 2020, up from $8.5 billion in 2015.[10]



ASD Healthcare tracks life-saving medication remotely

When and wherever possible, ASD Healthcare, a subsidiary of AmerisourceBergen, has worked to improve transparency, security and efficiency for specialty pharmaceuticals used throughout the healthcare system.

ASD Healthcare provides pharmacy-grade refrigerators, which allows professionals access to vital medications as and when they are required, with facilities charged for the medication only when they remove and use them. Using Vodafone's Managed IoT Connectivity Platform, ASD can remotely track stock levels and expiry dates of medication and enable alerts to clients to ensure that medication never spoils or runs out. So patients can be sure their medication always meets quality standards.

Through connecting refrigeration units in smaller practices and patient's homes, new markets have now been opened to ASD Healthcare.

4. Clinical trials:
enhanced visibility and control

Clinical trials are an essential but costly component of drug development. It typically takes pharmaceutical companies 17 years to get from basic science to clinical product.[11]

IoT can help make the clinical trials more effective, by rapidly providing deep levels of insight into the success of therapies — and potentially enabling ineffective trials to be cancelled quicker.

Wearables will have a big role to play, making it easy to collect large quantities of detailed physiological data from trial participants. This will make it less onerous to take part in trials — increasing the chances of recruiting members — and improve data quality.

IoT Managed Tablets can be used to accurately collate detailed qualitative data, providing a convenient and uniform way for trial members to record trial data. They can also remind participants to take medication.

Pharmaceutical companies will spend **$148 billion** on R&D by 2020.[12]

CRF connects clinical trials with Vodafone IoT

CRF Health is a leading global provider of electronic Clinical Outcome Assessment (eCOA) solutions for the life sciences industry. It provides an IoT trial recording system for 550 trials across 74 countries. CRF uses Vodafone IoT solutions to offer an enhanced service to clinical trial operators and their patients around the world.

"Having a trusted communications services partner is critical for us."
Jaime Racine, vice president of contracts and vendor management, CRF Health.

Vodafone makes it easy to get started with IoT

We simplify the installation and management of IoT. And with our expertise, service portfolio and solutions, we can help you achieve results quickly.

The four key elements for a simpler transition to IoT.

1 Professional Services help you deliver your IoT strategy

IoT can be complex, involving many parts of the business, new strategies, technologies and processes. Projects may need future-proof solutions, large-scale technical integration and regulatory compliance. This demands specialist skills and experience that many organisations do not have. Professional Services can help at every stage, from the initial scoping of the business case to day-to-day operations.

2 Connected devices sense their environment

It all starts with the assets — the things that you want to monitor and control. Whether they're small or large, mobile or fixed, mechanical or human, there's an IoT solution that's right. Equipping these assets with connected sensors gives you the power to monitor their behaviour or environment and communicate any changes you wish to make.

There are a range of connected devices that are designed specifically to suit healthcare applications, such as Managed Tablets to monitor adherence and patient outcomes, and connected cabinets and handhelds to enable efficient management of operations and estates.

3 Managed connectivity securely carries and controls IoT data

The network is at the heart of the IoT. The Vodafone network ensures a secure, reliable and global connection between health devices and a central, managed IoT platform, a web-based tool that enables you to manage data in real-time and monitor your patients and entire IoT estate, anytime, anywhere.

Connectivity often takes the form of a SIM card, meaning the IoT device can communicate via high-speed, reliable, cellular networks. But other forms of connectivity, such as satellite, fixed-line or Narrowband-IoT (NB-IoT), may suit your needs.

4 Applications enable the efficient delivery of healthcare

Vodafone has a number of software platforms that enable remote device and process management, as well as patient and provider engagement. These applications can be integrated with existing customer systems and are designed to improve patient outcomes and drive efficiencies through manufacturing and supply chains.

Vodafone is widely recognised as the IoT leader by industry analysts, including Gartner, and Analysys Mason.

Vodafone has dedicated operations and partnerships spanning the globe, ensuring secure connectivity wherever you need it.

Making it happen

Our comprehensive range of connected products enable you to get up and running.

Healthcare Platforms

We provide versatile software solutions that can be configured to support a range of healthcare scenarios. These solutions can include stock visibility products, medication reminders and alerts, and case management. They can help patients manage long-term conditions through motivational messages and goal-setting.

Managed Tablets and Handhelds

Our IoT Managed Tablets and handhelds provide cellular connectivity and management support, making them ideal for use in remote patient monitoring, clinical trials or for health visitors and social workers.

Integrated Terminals and USB Connect

Vodafone Integrated Terminals combine high-quality hardware with pre-configured IoT connectivity services. The compact 3G quad-band USB modem makes it easy to add IoT connectivity to a range of medical devices.

Connected Cabinets

These IoT-enabled refrigeration units can report on their location, operational status and stock levels in real time, helping you keep control over medicines.

Mobile Asset Tracking

Trackers can easily be fitted to everything from hospital beds to stock pallets, giving you near real-time visibility of each asset's location from an online portal, helping you reduce losses and monitor the cold chain.

Fleet Management

Combining in-vehicle tracking devices with smart applications, our fleet management solutions can help you get more from your first response, healthcare professionals or logistics vehicles.

Bespoke solutions

We can work in partnership to develop innovative soutions that meet your global requirements.

Why Vodafone?

IoT projects can be challenging. At Vodafone, we aim to make it easy. Here are three simple reasons why you should partner with us.

1 Unrivalled IoT experience

Vodafone has more than 1,300 dedicated IoT experts that you can rely on. We've been delivering IoT solutions to our customers for more than 20 years and have over 50 million IoT connections.

Vodafone has consistently been recognised for our IoT expertise, by clients and industry peers. We've been highly rated by leading industry analysts such as Analysys Mason and Current Analysis and we have been positioned as a leader in the Gartner Magic Quadrant for Managed Machine-to-Machine Services Worldwide for four years running.

2 Secure global networks you can rely on

Vodafone Group has mobile operations in 26 countries, partners with mobile networks, in 49 more and fixed broadband operations in 19 markets. As of 30 June 2017, Vodafone Group had 523.5 million mobile customers and 18.5 million fixed broadband customers, including India and all of the customers in Vodafone's joint ventures and associates.

Our scale doesn't just give you the confidence that we operate wherever you do business — it means we can offer the exceptional levels of service you need. And our healthcare customers can be confident that their IoT data is secure, monitored, protected and encrypted, achieving regulatory and compliance standards.

3 The solutions to simplify IoT projects

We have delivered IoT applications for organisations of all sizes and across all industries, so we know how to make your IoT solution deliver maximum value for you.

We partner with the world's leading connected device suppliers to offer a wide range of connected, innovative IoT solutions that take the complexity out of IoT deployment.

But even when you need a customised solution, our team of experts will ensure your business takes advantage of best practices and methodologies for IoT implementation to ensure you achieve maximum ROI.

To find out more about how we can help you take advantage of IoT to transform your business, visit **vodafone.com/iothealth** or email **iot@vodafone.com**.

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