

Monitor  
**Deloitte.**



Digital Health in the UK  
An industry study for the  
Office of Life Sciences

September 2015



# Contents

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|   |    |
|---|----|
| Foreword  | 1  |
| Executive summary   | 2  |
| Part 1. Market introduction                                       | 6  |
| Part 2. Telehealthcare  | 10 |
| Part 3. mHealth   | 21 |
| Part 4. Data Analytics  | 32 |
| Part 5. Digitised health systems                                  | 39 |
| Part 6. Conclusions on the digital health UK competitive position | 45 |
| Monitor Deloitte team   | 51 |
| References  | 52 |

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# Foreword

Welcome to the Monitor Deloitte report on Digital Health.

This is one of a series of reports reflecting work commissioned by Office of Life Sciences in March 2015 on key healthcare and life science industry segments in the United Kingdom.

Digital Health is an emerging industry arising from the intersection of healthcare services, information technology and mobile technology. Digital health innovations are only just starting to be more widely accepted as necessary for the future of efficient healthcare service delivery. As we address the behaviour, social, legal and technical challenges, over time, digital health advances have the potential to help increase access, decrease healthcare system costs and improve health outcomes. This report analyses trends in the digital health industry based on discussions with stakeholders, literature reviews and our work across the sector. It focuses on the United Kingdom but in the context of the global market and draws on examples from other countries.

The report considers the challenges to growth, barriers to adoption, shifting dynamics and how the emergent industry is developing. The intention is to provoke discussion and offer readers an overview of the industry challenges and dynamics in the United Kingdom.

We welcome your feedback and comments.

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# Executive summary

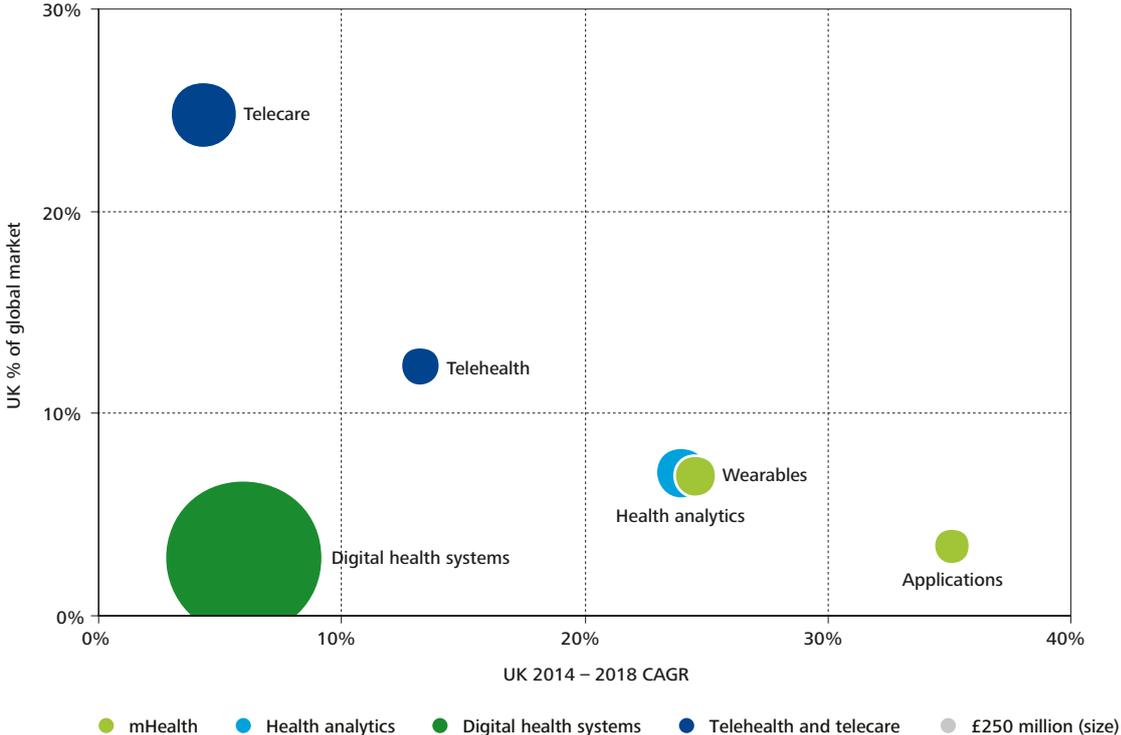
The UK is well positioned in many elements of digital health and has the potential to grow into a global leader in this segment. However, there are barriers to be overcome to realise this potential. To assess the current market, growth potential, industry composition and the UK's competitive position, we conducted a detailed examination of the digital health market in four sub-segments:

- **Telehealthcare (telecare and telehealth):** support and assistance provided at a distance using ICT and the remote exchange of clinical data between a patient and their clinician
- **mHealth:** mobile phone applications relating to health and/or wellbeing and connected wearable devices
- **Health analytics:** software solutions and analytical capabilities needed to assimilate big data
- **Digitised health systems:** digital health information storage and exchange of digitised patient medical records.

The four digital health sub-sectors reviewed in this report are highly interrelated. For example, telehealthcare is currently the fixed line version of specific, emerging parts of mHealth; however we expect the line between them to become increasingly blurred. Digital health systems are the primary care and hospital information systems and are essential for collecting data required for health analytics. These sectors face many similar drivers and challenges. However, they have different levels of maturity, rates of growth and market penetration.

The UK market size and growth is described in the context of the global market, together with an in-depth review of the market drivers and challenges. The UK competitive position is evaluated for each sub-sector, and the digital health industry as a whole. There are a number of challenges for new companies when commercialising and scaling up digital health businesses in the UK. Whilst there is a strong heritage in research and idea generation there are often problems with achieving scale. The problems include a lack of commercialisation skills, shortages of IT and analytical capabilities, difficulties in funding and challenges with accessing a local revenue stream in the NHS. Government also has a key role in providing the infrastructure, such as regulatory frameworks and information governance, to support growth of the sector.

**Figure 1. Size and growth rate by digital health sub-sector**



Source: Deloitte Analysis

## Telehealthcare

*The UK has a large installed telecare base and this position should be maintained in the short- to medium-term; however in the long-term this sector will integrate with mHealth.*

Telecare, which provides care and support at a distance using ICT, is a mature market in the UK with a strong heritage and the highest penetration per capita in the over 65s category of any global market. The strength of the UK market and global position is in part due to the UK being an early adopter, having had large central government programmes for telecare and a strong existing base of hardware. The telecare market is established and not expected to grow rapidly.

Telehealth, the remote exchange of clinical data between a patient and their clinician, is a faster growing and more dynamic market. The UK is not positioned as strongly as it is in telecare, but the telecare legacy has helped build a UK position despite relatively low adoption of telehealth in the NHS. There have been a number of initiatives designed to improve the evidence base and adoption of telehealth, the most well-known being Whole System Demonstrator (WSD) study. However, the evidence on cost-effectiveness produced from the WSD was viewed as disappointing relative to high expectations. As a result, adoption of telehealth is still subject to a number of barriers, including a perceived lack of evidence around cost-effectiveness, reimbursement mechanisms and clinical buy-in. Costs of telehealth and telecare have reduced since the WSD programme, changing the cost-benefit trade-off.

The UK advantage in telecare, and in part in telehealth, may be at risk over the short- to medium-term as the market is evolving. Fixed line and hardware-dependent systems, the current focus of large UK providers, are becoming increasingly mobile-based (i.e. merging with mHealth). Markets such as Spain and the USA are moving ahead with implementation of larger scale telehealth implementation, whereas the UK continues to be in pilot mode and this disadvantages local industry as the UK currently lacks the scale to drive growth in the sector.

## mHealth

*Currently, mHealth is being used more commonly by consumers to make decisions about wellness, but the potential lies in supporting higher-impact clinical decision-making and developing the interaction between clinicians and patients.*

mHealth, which can be defined as health-related mobile applications (apps) and health-related wearable devices, is an emerging market and is still small and fragmented. However, the mHealth apps sub-sector is growing rapidly, and is predicted to be the fastest growing segment in digital health, with a 2014 to 2018 CAGR of c. 35% in the UK and c. 49% globally. There is a high consumer demand for mHealth apps, but monetising them is difficult due to a lack of clear reimbursement models, particularly in the NHS. This is not just a challenge in the UK; a recent European Commission review of mHealth highlighted that this is also true across Europe.

The health apps market is segmenting and two different groups have emerged. One group handles low-confidentiality data (personal wellness and activity data); this is usually a consumer-driven purchase and strong consumer interest has attracted multiple companies into the space. The second group manages medium to high confidentiality data (health data and personal medical records); these are used by clinicians, patients or hospital system reporting. mHealth solutions in the second group offer the greatest potential to improve healthcare outcomes, but present challenges until we further improve access to data.

The UK is an attractive destination for app developers, with high levels of digital literacy and adoption, and a concentration of mHealth app companies around London. Wearables manufacture is concentrated in the US, particularly around Silicon Valley and there are few notable UK companies with a wearables focus, such as Fitbug.

## **Analytics**

*There is great potential for health analytics in the UK; however, challenges around data access need to be overcome in order to maximise the benefits and grow the industry.*

Health analytics is an emergent and fast growing digital health sector. The market is currently still relatively immature but expected to grow rapidly, c. 24% up to 2018. This growth could be exploited by UK industry to become a world leader in this sector, but there are barriers to overcome, such as development of relevant skills and capabilities, data access challenges and information governance issues.

The UK has a unique environment to develop the health analytics industry, combining the large volume of data being generated by the NHS, digital health solutions and investments in genomics. This is driven by a strong research and academic base, a single purchaser of healthcare and a willingness to develop the industry. Continuing to build the necessary infrastructure to access and use data will be necessary for this potential to be fulfilled.

## **Digital health systems**

*Large, North American companies dominate globally, but established local EHR providers may be able to leverage their track record in primary care to capitalise on the expected growth in secondary and acute care settings in the UK.*

The largest (and slowest growing) of the four sectors in the UK is digital health systems, including electronic health records EHR and e-prescribing, with a total current market size of £1.3 billion. The UK is a frontrunner in the use of primary care electronic health records due to early government initiatives to support system uptake. Acute hospitals have lagged behind and have been the focus of some recent government initiatives. Incentivising the use of EHR platforms and investing in interoperability will help the market reach its potential. The systems need to be able to move healthcare data securely across organisational boundaries, store highly confidential data safely, link data sets together and deliver consistent analytical methodologies that support clinical decision making. These actions are fundamental to improve the quality and efficiency of health care while maintaining patient confidentiality.

Whilst the UK was an early adopter of health information technology systems and has a strong position in primary care (e.g. EMIS), the major players in secondary care IT are mainly US based companies.

## **Conclusions**

Digital health is a fast growing industry and it has great potential to improve access to healthcare. Wide scale deployment/adoption also has the potential to improve efficiency, productivity and cost-effectiveness of healthcare delivery. Digital health is central to the delivery of the Government's NHS policy agenda and is a key enabler for realising the Five Year Forward View.

The UK has been an early adopter of several key parts of the digital health market, particularly telecare and primary care EHR systems. Historic top-down policy initiatives have often been the catalyst for widescale adoption. There are opportunities to accelerate adoption of secondary care electronic health records, mHealth and data analytics.

From our evaluation of the UK industry and competitive position, it is clear that although the UK is good at generating ideas we are less successful at commercialising them and building companies to scale. There are some significant opportunities within digital health that the UK could exploit, building on current government policies and initiatives, and inherent strengths in certain skills and infrastructure.

Partnerships between the public sector and private sector are critical to delivering growth in the digital health sector; Government has a key role in providing the infrastructure to support growth of the sector.

In writing this report, we acknowledge the important actions that have been taken so far to build and grow the UK digital health industry and there have been a number of significant early successes. However, overcoming the key challenges identified by our research will be important in securing the UK's competitive advantage going forward.

Interviews with key stakeholders identified five potential areas of improvement to grow the UK digital health industry:

1. Addressing a skills shortage in health analytics
2. Building managerial skills within NHS to better understand the potential value of digital solutions across the healthcare cycle
3. Improving clarity on how to access, transfer and analyse healthcare data (including the necessary incentives and information governance procedures)
4. Improving reimbursement policy to accelerate the use of digital health solutions
5. Building capabilities to commercialise and scale up companies in the UK digital industry

By addressing these issues and continuing to build on current initiatives, the UK is well-positioned to take advantage of the digital health opportunity.

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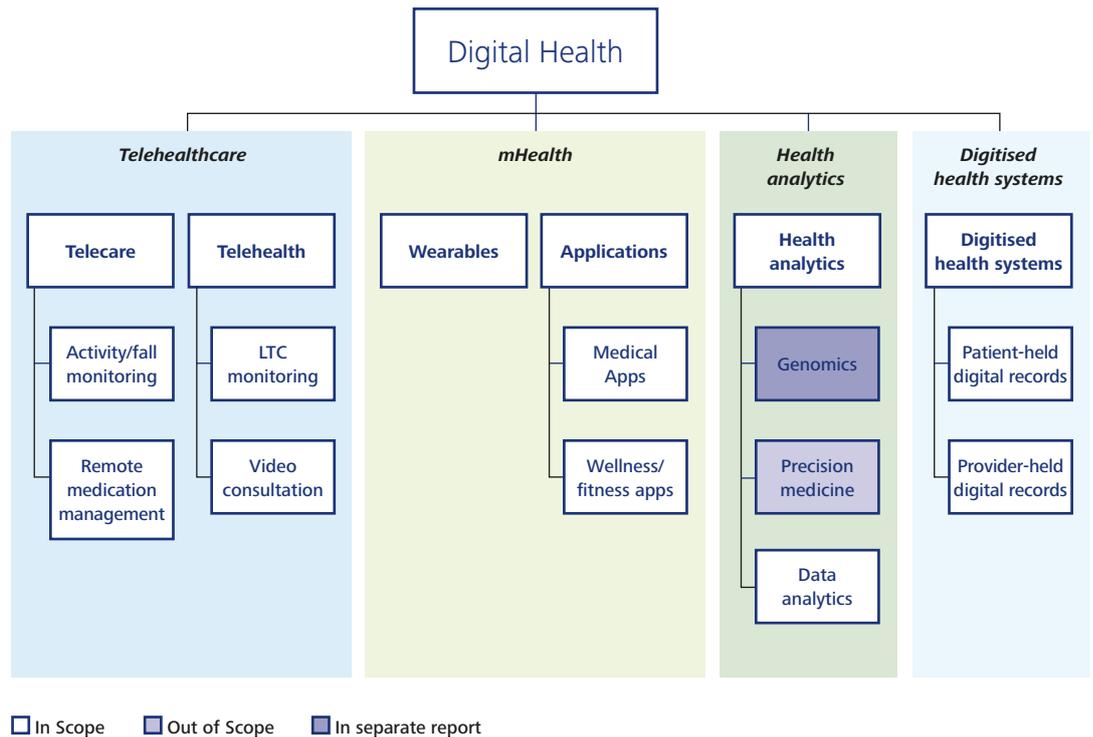
The UK is a frontrunner in the use of primary care electronic health records due to early government initiatives to support system uptake. Acute hospitals have lagged behind and have been the focus of some recent government initiatives. Incentivising the use of EHR platforms and investing in interoperability will help the market reach its potential.

# Part 1. Market introduction



The emerging digital health industry encompasses digital products that can monitor, analyse, educate or improve health. The industry can be segmented in a number of ways: in this report we have chosen to segment the industry into telehealthcare, mHealth, health analytics and digitised health systems as described below:

**Figure 2. Digital health industry sub-sectors**



Source: Deloitte Analysis

Telehealthcare is split into telecare and telehealth. The key distinction between the two subsectors is that telehealth systems enable the user to exchange clinical data with their clinician, whereas telecare systems monitor users to provide assistance at a distance, for example fall detection. Currently these systems often use bespoke hardware-based solutions, but will increasingly overlap with mHealth apps as new mobile or “bring your own device” solutions are developed.

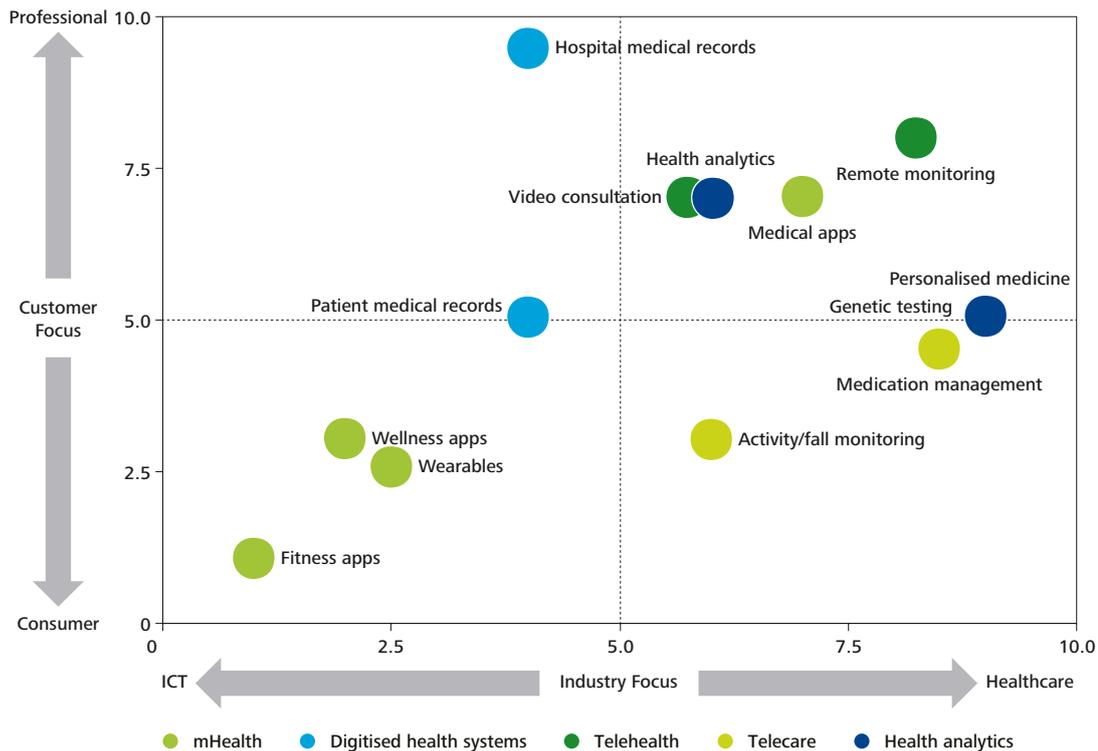
Our mHealth definition consists of wearables and apps. Wearables are hardware products that monitor activity levels, heartrate or sleep patterns and apps are software based health solutions. Apps span a spectrum from consumer driven wellness and fitness apps to professional driven medical apps. Both utilise the users existing mobile devices.

Of the health analytics sub-sectors, we will only be reviewing data analytics in more detail. Genomics is covered in a separate report and precision medicine is out of scope.

Finally, digitised health systems can be divided into two areas: patient-held medical records and health system-held health records. Patient-held medical records, such as Patients Know Best, are controlled by the patient, who grants access to medical professionals. Health system-held medical record systems are electronic versions of traditional paper records, for example in primary care or acute hospital systems, but with additional functionality. This market is dominated by large, often international companies.

Each sub-segment reviewed in the report varies in two dimensions: the focus between health outcomes and ICT and their target market. Products and services targeted at healthcare professional include digitised health systems and telehealthcare, whereas wearables and wellness/fitness apps are aimed at consumers.

**Figure 3. Digital health industry by customer versus industry focus**

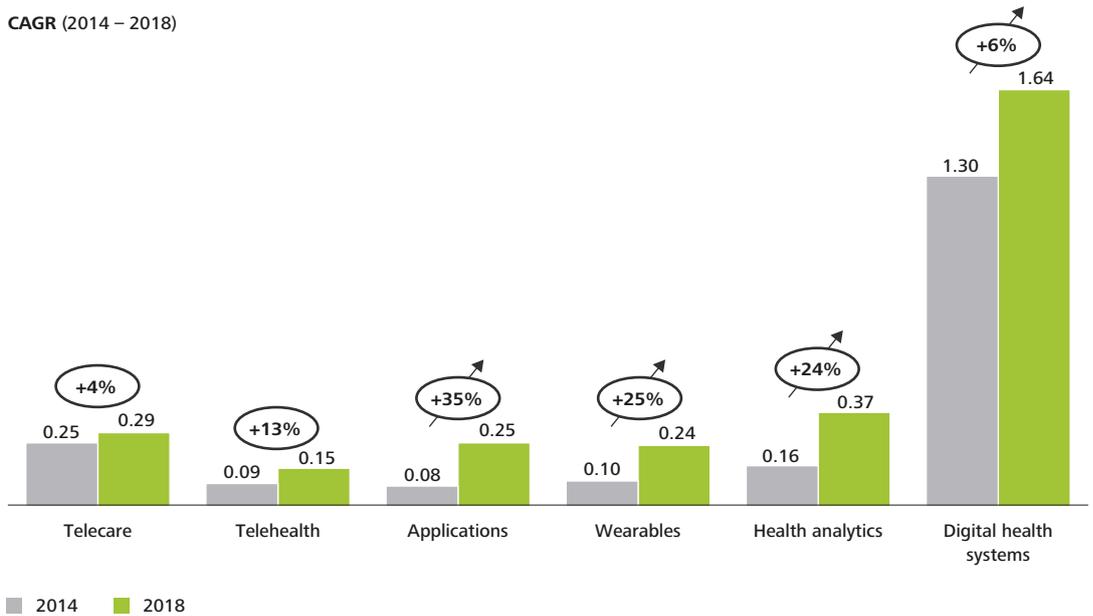


Sources: Frost & Sullivan, Cambridge Health/tech Institute, Deloitte analysis

The global market for digital health is worth £23 billion in 2014 and is expected to almost double to £43 billion by 2018, a CAGR of c. 18%. The UK market size is £2 billion and with the right support, is expected to grow to £2.9 billion by 2018 with a CAGR of 11%, driven predominantly by high growth in markets such as mHealth apps (35% CAGR) and health analytics (24% CAGR). Therefore, the UK market represents a c. 9% share of the global market in 2014, which we predict will fall to c. 7% in 2018 due to stronger growth in other markets.

**Figure 4. UK digital health markets 2014 – 2018 (£bn)**

CAGR (2014 – 2018)

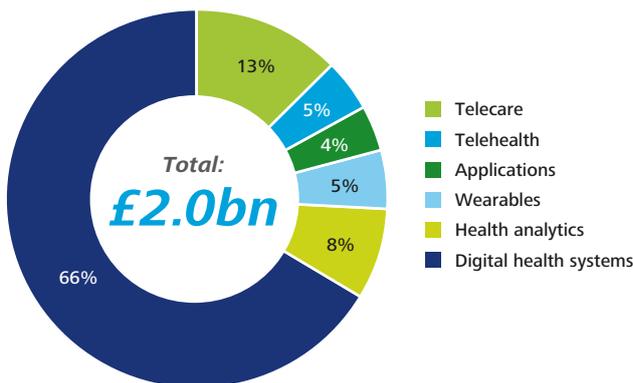


Source: Deloitte analysis

Digital health systems represent the largest market both globally and in the UK where they contribute 66% of digital health sales. However, this is predicted to grow at 6% p.a. in the UK, and 7% p.a. globally by 2018. Market penetration is already high in UK primary care as there have been several government initiatives that have driven adoption. However, penetration in secondary care has lagged behind primary care adoption.

Telecare is the second largest sub-sector and contributes 13% of the UK digital health market. It is a relatively mature market, predicted to grow at 4% per annum.

**Figure 5. UK digital health markets 2014**



Source: Deloitte analysis

The most promising market for growth is mHealth apps, which is currently the smallest digital health market sub-sector but is predicted to grow at 35% in the UK and 49% globally from 2014 to 2018. Over time, we anticipate that telecare and telehealth will start to merge with the mHealth apps market, and mHealth will be increasingly differentiated by the audience targeted for the app (i.e. consumer/patient or professional).

There are a wide range of UK based companies in each sector, with the exception of mHealth wearables. Revenue sources vary greatly from company to company with large multinational firms generating up to 80% of income from exports. The challenges facing companies in each sub-sector with regard to establishing, building and scaling business are discussed in more detail throughout this report.

**Figure 6. Digital health industry key statistics**

|                        | 2014 UK market size (£m) | 2018 UK market size (£m) | 2014-2018 UK CAGR | 2014 global market size (£m) | 2018 global market size (£m) | 2014-2018 CAGR |
|------------------------|--------------------------|--------------------------|-------------------|------------------------------|------------------------------|----------------|
| Telecare               | 246                      | 292                      | 4%                | 995                          | 1,149                        | 4%             |
| Telehealth             | 90                       | 148                      | 13%               | 732                          | 1,236                        | 14%            |
| Applications           | 75                       | 250                      | 35%               | 2,200                        | 11,000                       | 49%            |
| Wearables              | 100                      | 241                      | 25%               | 1,456                        | 3,095                        | 21%            |
| Health analytics       | 155                      | 366                      | 24%               | 3,300                        | 7,200                        | 22%            |
| Digital health systems | 1,300                    | 1,640                    | 6%                | 14,700                       | 19,300                       | 7%             |



Source: Deloitte Analysis

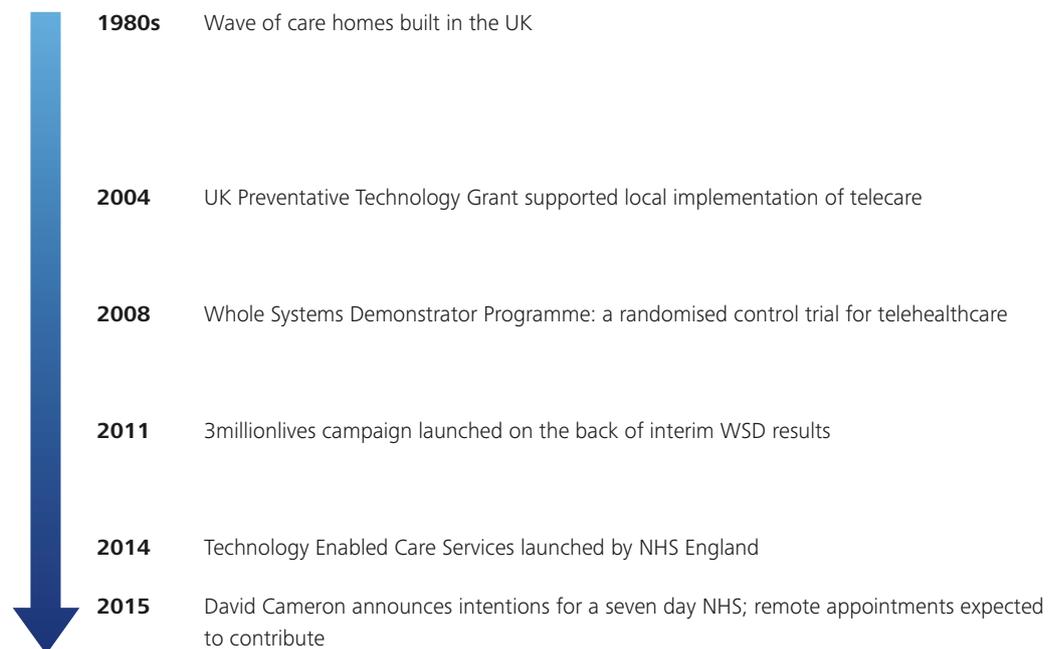
# Part 2. Telehealthcare



Telehealthcare comprises telecare and telehealth services. The Telecare Services Association (TSA) defines telecare as support and assistance provided at a distance using ICT, such as fall alarms, and telehealth as the remote exchange of clinical data between a patient and their clinician.

In order to understand the markets for telehealth and telecare it is important to note the role of government in encouraging industry development and demand. An overview of key events in the UK market is shown in figure 7.

**Figure 7. UK telehealth and telecare market context**



Source: Deloitte research, interviews and analysis

In 1980, the introduction of Supplementary Benefits regulations enabled people entering private residential care to obtain financial support for the first time. This significantly grew private provision of residential care in the 1980s in combination with growth in the ageing population, changes in family care and increasing pressure on hospital beds. This growth provided the opportunity for UK telecare companies such as Tunstall to develop services and establish a hardware base, and is one of the factors that has contributed to the strong position of the UK telecare market.

In the 2000s, the UK government implemented a number of policies to stimulate demand for telehealth and telecare in the UK. The Preventative Technology Grant, launched in July 2004, provided £80m of government funding to help local councils invest in technology (at that point, primarily telecare) to support individuals in the community. By 2004, there were around 1.4 million people linked to a community alarm. In 2008, the Department of Health launched the Whole System Demonstrator Programme (WSD), the largest randomised control trial of telehealth and telecare to date. Interim findings indicated that at least 3 million people with long-term conditions and/or social care needs could benefit and, if used correctly, telehealth could deliver a 15% reduction in accident and emergency (A&E) visits, 20% reduction in emergency admissions, 14% reduction in elective admissions, 14% reduction in bed days and 8% reduction in tariff costs.<sup>1</sup> However, after full analysis at the end of the study, the trial failed to provide the 'proof of concept' on cost-effectiveness that it set out to demonstrate<sup>2</sup> and the impact of this outcome remains a barrier to the implementation of telecare and telehealth today.

Following the interim results of the WSD programme, the Department of Health launched the “3millionlives” campaign, with the aim of bringing the benefits of technology to three million potential beneficiaries. The programme expressed a commitment to work with industry, the NHS and social care to roll out telehealth and telecare as a mainstream service and remove barriers to delivery in the UK. In 2014, 3millionlives was refocused to address the demand for practical tools and support to commission, procure, implement and evaluate technology enabled care services, and was renamed Technology Enabled Care Services.<sup>3</sup>

The UK telecare and telehealth markets remain heavily reliant on government funding and incentives. Local authority budget constraints have led to a tightening of eligibility criteria for telecare services and changes to the way services are delivered in order to boost efficiencies. The telehealth market continues to face significant barriers in terms of generating clinician support and evidence to gain wider UK adoption.

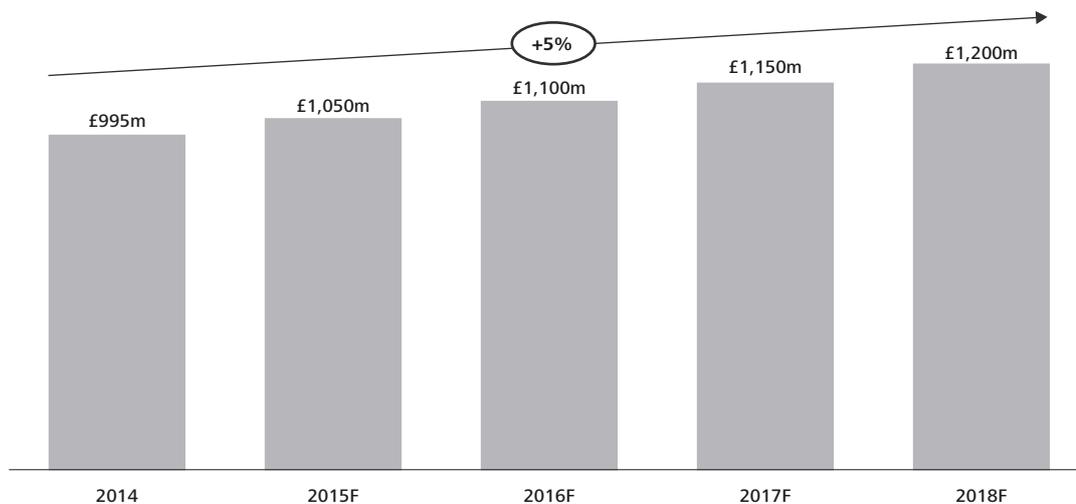
### Global market size and growth

The combined global telehealth and telecare markets are worth over c. £1.7 billion. The markets are highly fragmented, with the exception of a few large international players.

#### Telecare

The global telecare market is valued at c. £1 billion and is forecast to grow at a CAGR of 5% by 2018.<sup>4,5</sup>

**Figure 8. Global telecare market revenues, 2014-2018 (£m)**



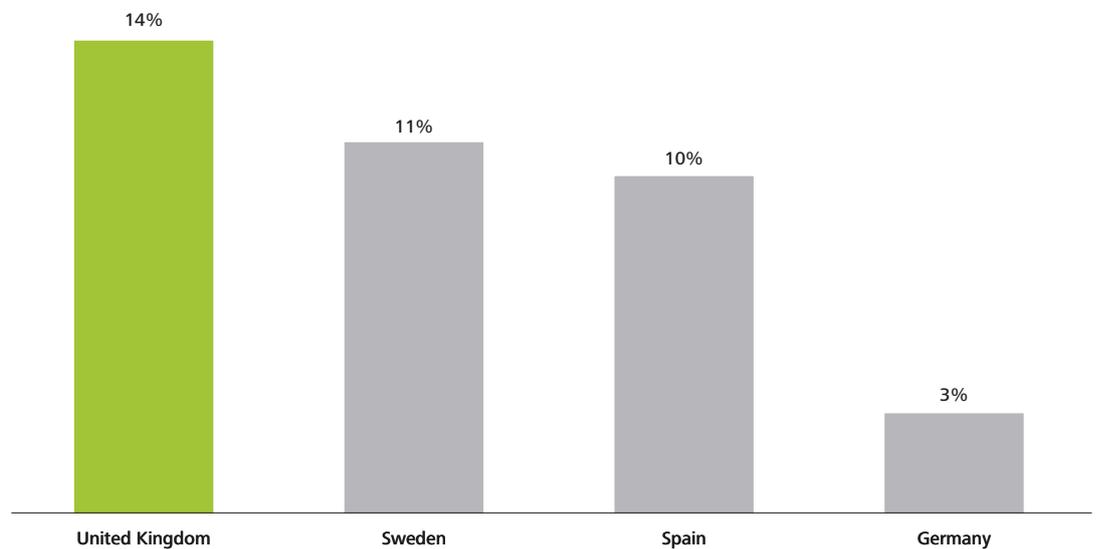
Sources: Deloitte Centre for Health Solutions, 2012, Remote Patient Monitoring Market in Europe, Frost & Sullivan, 2010, Mint, Deloitte research, interviews and analysis

Note: global market sizing based on current available data and assumption that telecare penetration in Africa and Latin America is very low

Telecare penetration tends to be higher in markets where telecare is funded or heavily subsidised by the state such as the UK, Spain, and Sweden. Pricing varies by market due to variations in market maturity and structure; public-pay markets tend to have lower prices. Germany's high prices are attributable to the predominance of private payers in the market and a limited number of telecare service providers. In the US telecare market, hardware has become increasingly commoditised, technology costs have fallen, and telecare prices have reduced. However, this has been partially countered by an increasing propensity to outsource monitoring, response services and other high-value services.

The UK has good telecare penetration compared to other countries with c. 14% of over 65s having a telecare service, and the UK telecare market makes up 25% of the global market.<sup>6</sup>

**Figure 9. Telecare penetration in selected European countries, as a percentage of over-65 population**



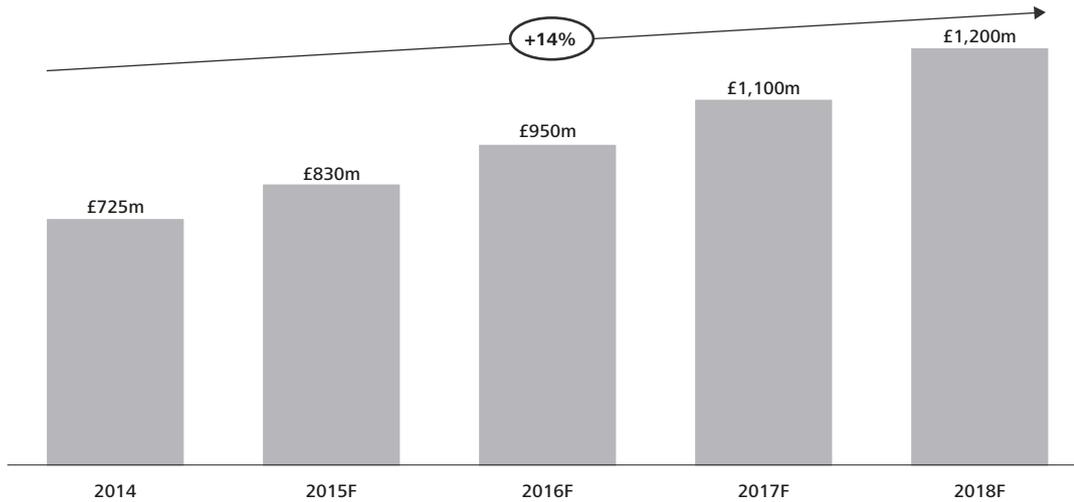
Sources: ICT and Ageing from the European Commission, 2010, Deloitte analysis

Tunstall is the global market leader in telecare, followed by Philips Lifeline. In recent years, Tunstall has increased its geographical presence through the acquisitions of American Medical Alert Corporation (USA) in 2011, STT Condigi (Nordics) in 2012, and Televida (Spain) in 2013. Beyond these top two players, the market is fragmented.

## Telehealth

The global telehealth industry is forecast to grow from c. £700 million to £1.2 billion between 2014 and 2018, a CAGR of 14%.<sup>7,8</sup>

Figure 10. Global telehealth forecasted market growth 2014-18 by revenue (£m)



Sources: Frost & Sullivan 2010, Deloitte Centre for Health Solutions 2012, Mint, Deloitte research, interviews and analysis

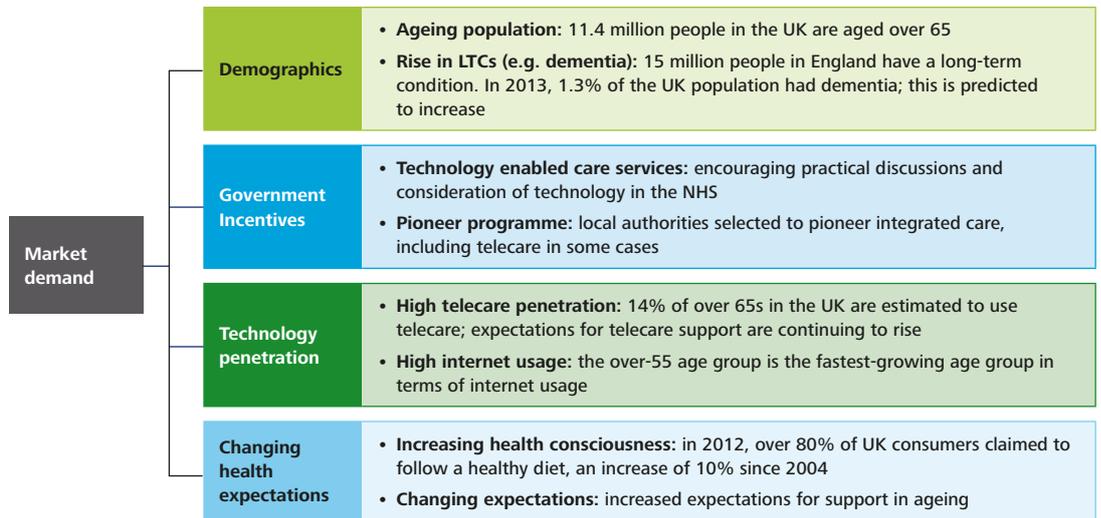
Growth rates of up to 50% in global telehealth sales are predicted by some analysts. However, we forecast a more conservative growth rate due to current barriers to telehealth uptake, such as fragmented healthcare communication systems and lack of clinician incentives.

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## The trends driving and constraining growth

The trends driving UK growth in telecare and telehealth can be summarised as follows:



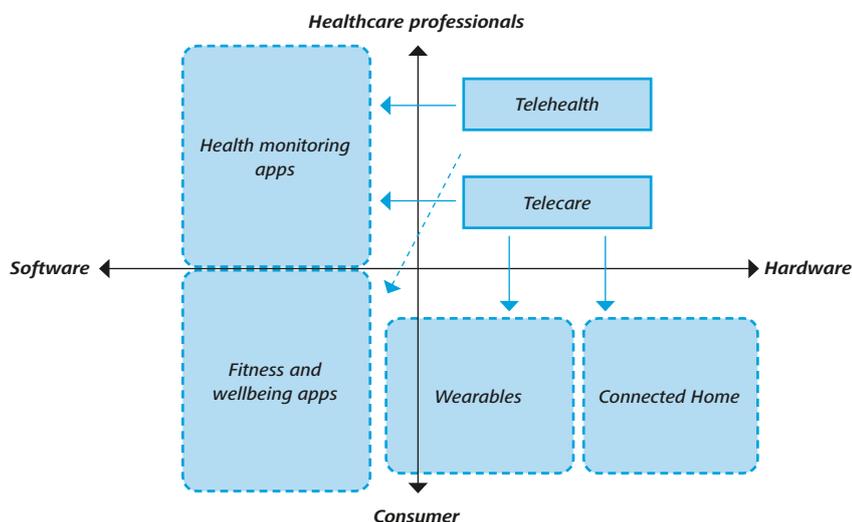
Sources: UK Office for National Statistics, Long term conditions compendium of information, Department of Health, 2012, Alzheimer’s Society, 2014, European Commission, 2010, Leatherhead Food Research, 2012

We have distilled three key themes that will impact the market for telehealthcare over the next few years:

***Theme 1: disruptive changes could impact the current model of delivery for telecare and telehealth, and telehealthcare is likely to converge with mHealth and connected home solutions***

Deloitte predicts that the over-55s will be the age group experiencing the fastest year-on-year rises in smartphone penetration across developed markets,<sup>9</sup> suggesting that there is a strong pipeline of tech-savvy seniors for the health market. This could drive a convergence between telehealthcare and mHealth, as demonstrated by the entrance (and exit) of non-medicine related players in the telehealth and telecare space. For example, O2 briefly attempted to enter the telehealth space in the UK only to withdraw its Help at Hand and Help at Home services, citing the slower than anticipated uptake of mobile telecare and telehealth in the UK.<sup>10</sup> Companies such as Philips have had more success with telehealth, demonstrating positive outcomes with its Hospital to Home digital telehealth offerings in the US, and growing to be a major player in remote vital signs monitoring in the USA.<sup>11</sup> Tailored apps allow family members to monitor an older person or child’s activity using geolocation. KeepUs is an example of a free app that describes itself as a “real solution for the families of elderly people who want to continue living active, independent lives,” making it a telecare competitor.<sup>12</sup>

**Figure 11. Telecare, telehealth and the convergence with adjacent services**



Source: Deloitte analysis

There has been significant innovation in mHealth apps, some of which can perform vital signs monitoring activities. Although many of these applications remain unregulated, and therefore available for use at the consumer’s discretion, they represent an interesting movement toward self-care and monitoring, enabled by easy-to-use software. For example uMotif is a mHealth app that allows patients to use their mobile phone to track symptoms, as well as assess the patient’s mood and send medication reminders.<sup>13</sup> The app can be adapted to a number of conditions by using a subset of the 250 available symptom trackers. With time it can reasonably be expected that innovations such as these will start to take on more of the functionality of traditional telehealth and telecare hardware.

There is also pressure on telehealthcare from related companies in the connected home space. For example, electrical manufacturer LeGrand acquired UK telecare company Tynetec in 2013.<sup>14</sup> Legrand is best known for wireless lighting and home controls. Convergence with the connected home is driven, at least in the UK, by private residential care homes who seek to differentiate themselves with a younger, and more tech-savvy, age group. The connected home concept has started to see adoption mainly through single point of use apps. For example, British Gas acquired Internet of Things app ‘AlertMe’ for £44 million in order to expand its Hive business and has installed more than a million smart meters in homes and businesses to date.<sup>15,16</sup> As the concept of being able to connect remotely to homes becomes increasingly accepted by consumers, we are likely to see more opportunities for telehealth and telecare to become integrated and drive market growth. The desire to become a platform player in this space has attracted new entrants from various related industries. However, as the high-profile failures of initiatives such as Google Health show, this space requires detailed knowledge and stakeholder buy-in, especially at a platform level.

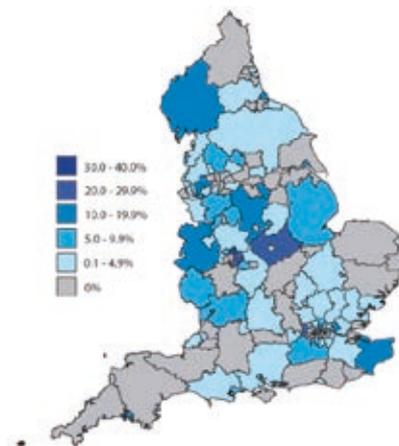
***Theme 2: The ability to provide cost-effective care is a significant driver for the telehealthcare industry***

There are three factors contributing to the global need for cost-effective care. The first is demographic changes resulting in an ageing population. The second is a rise in long-term, chronic conditions. And the third is that, as a result, healthcare budgets in many countries are increasingly stretched. Telehealthcare is seen as a potential solution to these problems; however the evidence that telehealthcare is a cost-effective option has yet to be conclusively accepted.

The ONS projects an increase in the UK over-65 population of 1.2% per annum between 2014 and 2018.<sup>17</sup> Elderly populations are more reliant on the healthcare system than their younger counterparts, and the resources required for caring for an ageing population are becoming a financial burden on developing countries. As an example, the number of emergency admissions for those aged over 65 years has increased by 46% over the past decade.<sup>18</sup> In addition, there continues to be a rise in chronic conditions: the UK has seen the number of people diagnosed with diabetes increase from 1.4 million in 1996 to 3.3 million in 2014, with projections estimating 5 million diabetics in the UK by 2025.<sup>19</sup>

The NHS faces a budget deficit of £20 to £30 billion in the coming years,<sup>20</sup> which provides a strong incentive to increase the use of technology within the NHS in order to prevent emergency admissions through better monitoring. Telecare services are normally procured by local authorities as part of social care packages, and research suggests that most local authorities (c. 53% in 2013) are willing to invest in telecare, although there are some regional differences in the budget they are able to dedicate.<sup>21</sup> For example, Sheffield City Council reported to have 12,015 people using telecare services in 2011/12, while Swindon Council reported having just 75 users. Cuts in social care budgets have resulted in tightening eligibility criteria and an increase in co-payments by the user. Telecare is also increasingly available as a consumer product, thus private spending is forecast to increase faster than public spending. Another consequence of budget restrictions is a trend towards managed services in telecare provision, where hardware and response services are bundled for a monthly fee within local authorities. This will benefit companies who carry out later stages in the value chain.<sup>22</sup>

**Figure 12. Telecare spend as a percentage of the £648 million funding made available to local authorities for social care services**



Source: Good Governance Institute, September 2012

Privately retirement home developments continue to grow, driven by the increasing demand from an ageing population combined with a reduction in local authority capacity and budget to provide residential care.<sup>23</sup> Developers use telecare systems within their properties to monitor resident's needs and provide secure communication systems for staff. This segment will continue to contribute to market growth, although at the high end such as retirement village complexes, these are beginning to converge with connected home concepts as described above.

Previous attempts to generate evidence of a return on investment in health technology, such as the Whole System Demonstrator programme, have not been fully successful. However, in the WSD final report, it was recognised that the study methodology may have resulted in an unfavourable outcome: for example, a longer follow-up of telehealth might have revealed improved quality of life, and patient and family perception of quality of care were not assessed though these are important elements of telehealth.<sup>24</sup> In addition, as the price of technology declines, telehealth becomes more cost-effective than in the WSD analysis, particularly for telehealth run on the patient's own devices.

The Technology Enabled Care Services (TECS) programme is expected to continue to improve communications around the benefits of telecare, and drive demand.

***Theme 3: Implementation challenges, including poor payer incentives, are significant barriers to realising potential cost savings from telehealth and telecare***

The promise of lower care costs as a result of telehealth and telecare is partly dependent on alignment of incentives. For example, telecare is usually funded by local authorities as part of social care delivery, yet often delivers healthcare benefits and savings to the NHS. Telehealth may reduce visitor numbers to a hospital, resulting in lower income, but a better standard of care. Thus, budget silos and short return on investment (ROI) requirements create perverse incentives that are barriers to mainstream telehealth and telecare adoption.

The telehealth market continues to remain at an early stage due to a lack of clinician buy-in and integration with other healthcare systems including medical records. In an NHS trial of GP Skype consultations, 94% of patients reported they would use the system again with 83% happy with the privacy aspect.<sup>25</sup> As costs for video consultation continue to fall and it becomes increasingly accepted, remote appointments may become standard practice. However, demand for these services was lower than expected, suggesting that the patients volunteering for a trial were the early adopters and teleconsultation is yet to meet the early majority despite early promise.

Implementation of telehealth is challenging for commissioners. 108 out of 176 CCGs were commissioning telehealth services in 2013/14, expecting to spend around £15.2 million in total in this period.<sup>26</sup> However, 28% of these reported problems including lack of end-user adoption and problems with suppliers. For example, Medway CCG in Kent expected 250 patients to be set up by September 2013; in reality only 19 patients were set up. In North Lincolnshire CCG, just 26 patients of an anticipated 120 were accessing telehealth, with many clinicians citing the results of the Whole System Demonstrator was a key reason. Clinicians also need to be convinced that telehealth reduces their workload. Of the 26 pioneer CCGs, six decided to no longer commission telehealth and telecare due to the highly complex nature of delivering telehealth and telecare. This was despite the fact that since the programme was carried out technology costs fell significantly, improving the cost-effectiveness of telehealth and telecare.

The following steps, presented in *Tackling Telehealth: How CCGs can commission successful telehealth services*,<sup>27</sup> would reduce the barriers to commissioning telehealth services and provide a helpful summary of many of the challenges faced by commissioners:

1. identify leaders and champions throughout the commissioning cycle to communicate the benefits of telehealthcare
2. enable patient engagement
3. consider how telehealth can be used alongside other solutions as a part of integrated care
4. focus digital delivery on areas where self-care would have the greatest impact
5. anticipate 'consequence costs', such as the impact of increased clinician alerts
6. ensure digital delivery is suited to the patient base
7. rigorously evaluate progress
8. consider other improvement tools to improve commissioning more generally
9. work closely with all stakeholders and highlight the benefits of technology for all

Kaiser Permanente, an American integrated managed care consortium, is an example of successful telehealthcare adoption as a result of well-aligned incentives. All hospitals and most medical clinics/imaging labs are built with telehealth and telecare capabilities and electronic health records support telehealthcare applications. In 2011, Kaiser implemented over 50 telehealth/telemedicine projects that provided over 250,000 visits or encounters.<sup>28</sup> Their strategy is to focus on management of chronic illness and delivery of special services: because while chronic patients account for 5-10% of members, they account for 60% of total costs.

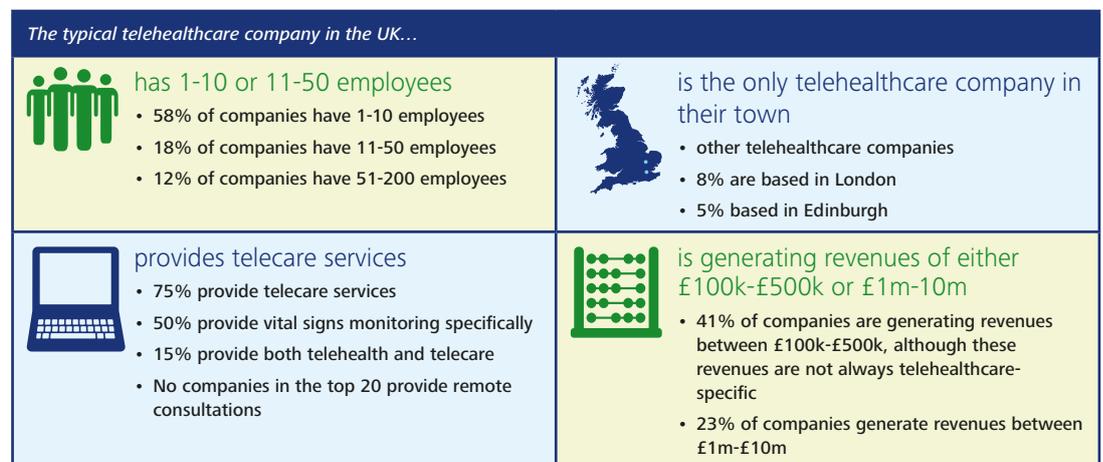
Another potential solution to misaligned incentives is the integration of health and social care budgets. This is currently being piloted in Manchester, at a combined value of £6 billion.<sup>29</sup> Integrated care services are expected to contribute to greater out of hospital care and effectively prevent and manage long-term conditions to reduce demand on services. A number of interviewees in the telehealth, telecare and wider digital health industries were positive about this move, seeing it as a clear signal that digital interventions were more likely to be implemented and measurable.

### UK competitive position

There are over 60 companies in the UK providing services that include telecare and telehealth as defined by this report, and in total employ c. 7,000 employees. However at least one third of these companies do not primarily specialise in telecare or telehealth: some offer other services such as selling medical equipment. It is estimated that the total number of employees engaged in delivering telehealthcare services is less than 2,000, coming from fewer than 20 companies. Of all UK telehealth and telecare companies, around 20% are mid-sized companies with 11-50 employees.

The majority of UK telecare sales (an estimated 90%) are to the statutory market.<sup>30</sup> Local authorities are key customers in the UK, having access to end-users as well as decision making power for state-provided telehealth and telecare solutions. The c. 10% of private pay customers includes individual consumers, who typically buy directly from telecare providers or through charities such as Age UK, and private care homes. There is also an increasing requirement for local authority users to co-pay out of pocket for their service.

Figure 13. The typical UK telehealth and telecare company



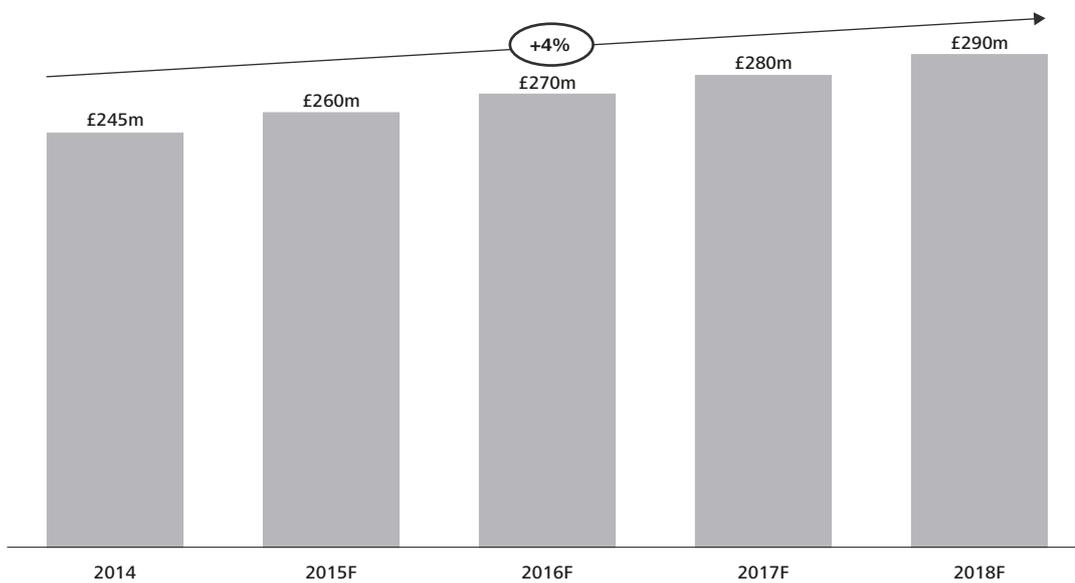
Source: Deloitte analysis

### UK market growth

The UK telecare market is expected to grow at a CAGR of 4-5% from 2014 to 2018. Growth will be driven by the ageing UK population and a small increase in penetration, as a result of government initiatives. This estimate is lower than previous market reported growth rate estimates as penetration is already high and the market continues to consolidate. The UK telecare market has a few major players; the remainder of the market is highly fragmented.

We have not assumed a significant capital replacement in the UK to facilitate the shift for analogue to digital connectivity (internet protocol) in our growth estimates.

Figure 14. UK telecare market predicted growth by revenue, 2014-2018 (£m)



Sources: Frost & Sullivan 2010, European Commission 2013, Deloitte Centre for Health Solutions 2012, Mint, Company reports, and Deloitte research, interviews and analysis

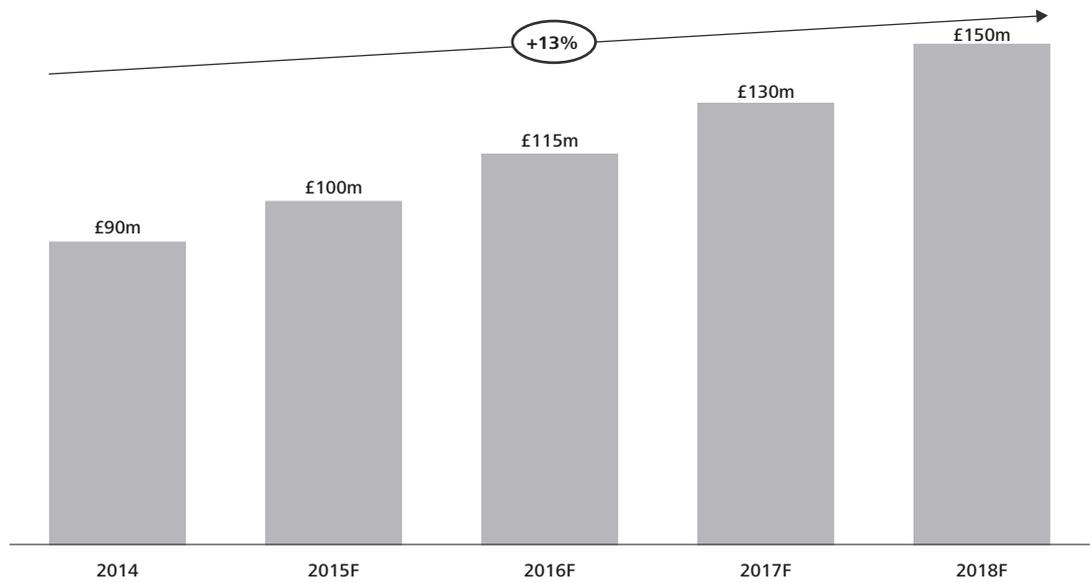
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The UK telecare market is expected to grow at a CAGR of 4-5% from 2014 to 2018.

The telehealth market in the UK was valued at £90 million in 2014. There is little geographical clustering in this sector, perhaps due to the highly localised nature of CCG/acute trust sales and the five largest UK companies comprise less than 20% of total revenues. The majority of revenues are from vital signs monitoring, as opposed to remote appointments (teleconsultation).

The UK telehealth market is predicted to grow at c. 13% per annum in the next few years. This is an increased rate from recent years, but a slower growth than expected in the US where reimbursement and partnerships with Accountable Care Organisations (ACOs) are expected to drive adoption and growth.

**Figure 15. UK telehealth predicted growth by revenue, 2014-2018 (£m)**



Sources: Frost & Sullivan 2010, Deloitte Centre for Health Solutions 2012, Mint, and Deloitte research, interviews and analysis

As prices for digital technology continue to fall, the cost of telehealthcare will decrease making it increasingly cost effective. This will drive penetration across all patient groups providing that the barriers noted above are addressed.

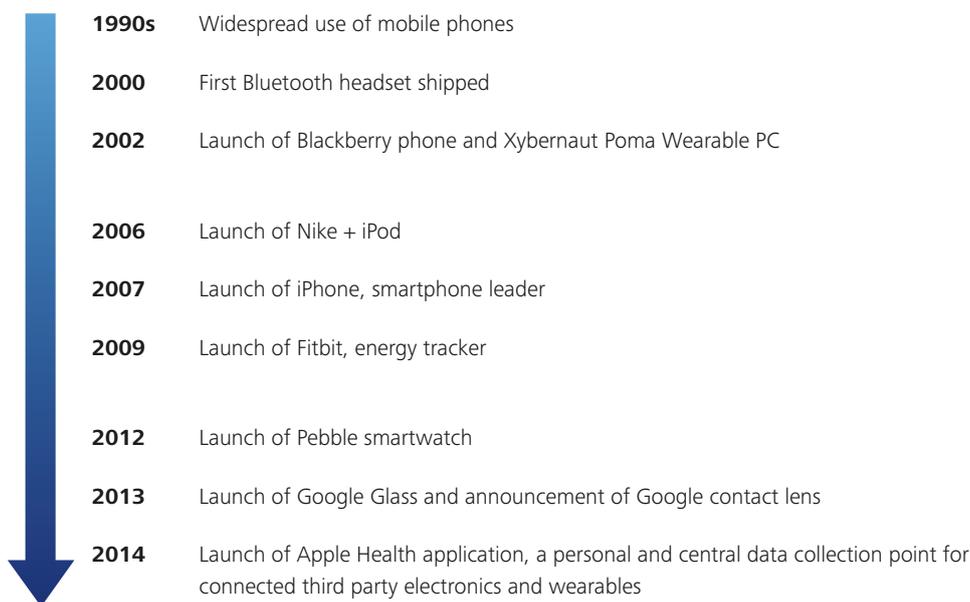
# Part 3. mHealth

The World Health Organisation considers mHealth to be a component of eHealth, defined as the “medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs) and other wireless devices”. We define the mHealth industry in terms of health-related mobile applications (apps) and health-related wearable devices.

The mHealth industry has developed off the back of a number of technological advances and continues to develop rapidly:



**Figure 16. mHealth market timeline**



Source: Deloitte research

Mobile phones were first used for healthcare purposes as early as the 1990s, but the mainstream potential was never fully explored until the early 2000s with the advent of improved connectivity and device sophistication.

mHealth apps can split into two categories. Consumer-led fitness and wellbeing apps handle low-confidentiality data (personal wellness and activity data) and are usually a consumer-driven purchase. Clinically-led apps manage medium to high confidentiality data (health data and personal medical records); these are used by clinicians, patients or hospital system reporting to aid prevention, diagnosis, and/or monitoring of disease. In the clinical setting, apps have the potential to improve productivity as well as providing a method for managing confidential data. For example, Healthy.io is an app that allows patients to analyse their urine at home using a small kit and their camera-phone to get a medical reading within 2-3 minutes. Another example is MedShr, which enables doctors to use their smartphone to securely share and discuss cases as part of their everyday clinical practice.

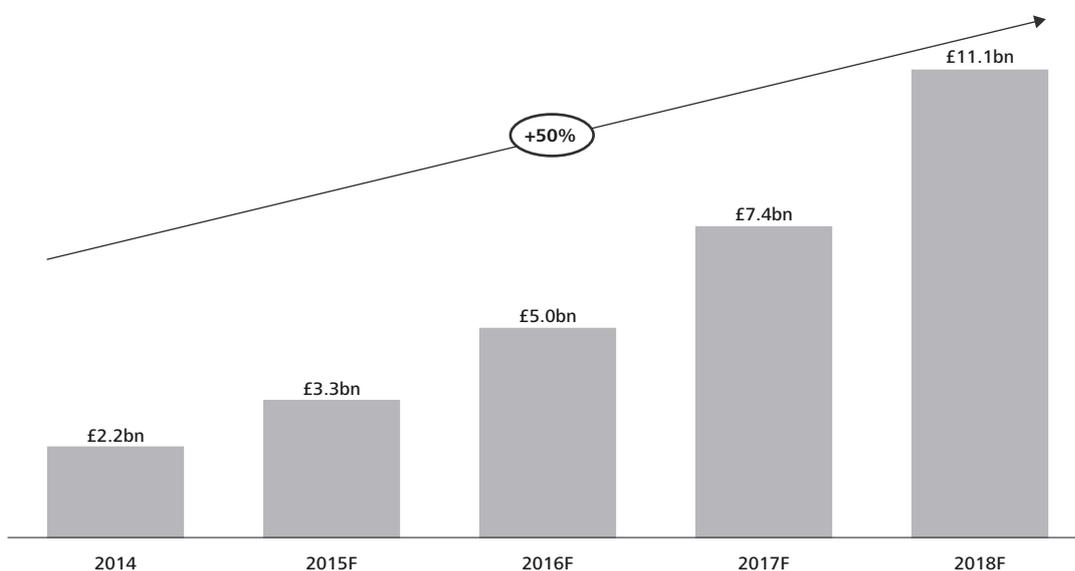
Wearables are electronic devices worn on the body externally, often as an accessory, which are able to track movements and actions. These technologies include internet connected smart watches and shoes with sensors. Common uses are tracking activity and sleep. Similar to mHealth apps, data is primarily between the user and the wearable device, but there is the potential to allow users and devices to communicate with healthcare providers. Wearables were developed later than apps: Fitbit, the global market leader, entered the market in 2009.

## Global market size and growth

### mHealth apps

The global mHealth app market was worth £2.2 billion in 2014. Whilst individual forecasts about the size of the mHealth market vary widely, analyst forecasts are in consensus that it will grow at a rapid pace. Published mHealth apps more than doubled in the 2.5 years prior to Q1 2014 and by 2014, there were more than 100,000 mHealth apps available for download.<sup>32</sup> Between December 2013 and June 2014, there was a 62% increase in activity amongst health and fitness app usage.<sup>33</sup> Based on a triangulation of estimates and Deloitte interviews, our view is that the global mHealth market will grow at a CAGR of c. 50% from 2014-2018, reaching a global market size of c. £11 billion in 2018.<sup>34,35,36</sup>

Figure 17. Global mHealth app market 2014-2018 (£bn)



Sources: GSMA and AT&Kearney 2012, BCC Research 2014, Deloitte Centre for Health Solutions 2015, Mint, Deloitte research, interviews and analysis

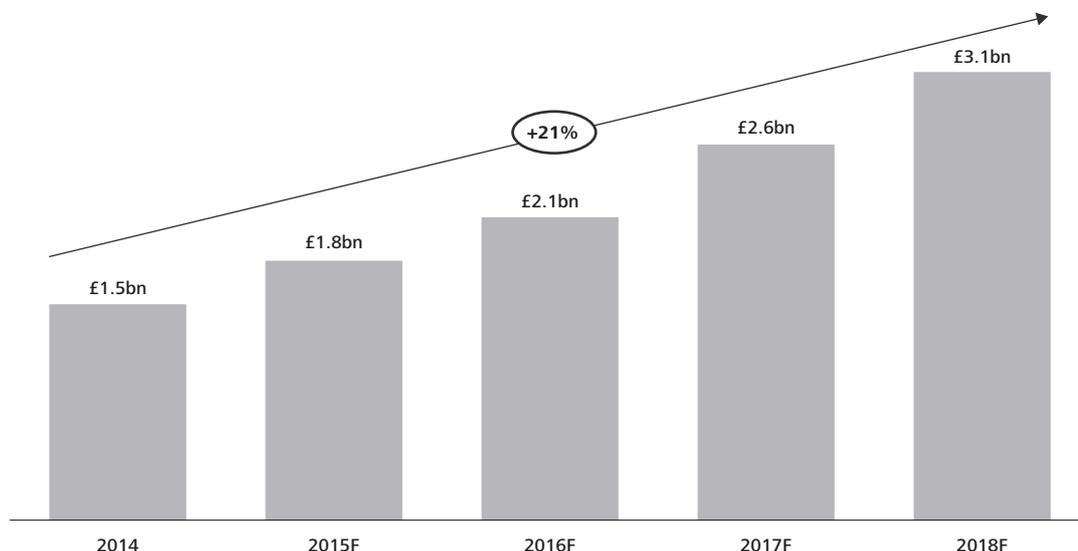
A 2012 Ruder Finn survey showed that regular mHealth app usage trails other segments, when usage is defined simply as the number of times the application has been accessed on a smartphone. Social media apps (59%), game apps (56%), news apps (45%), shopping apps (28%), sports apps (27%), travel apps (26%), hobbies and interest apps (23%) were all used more regularly than health and healthy living apps (16%).<sup>37</sup>

### Wearables

The market for wearables is the most newly established digital health market segment, and wearable devices are not as well-adopted as mHealth apps. However, in contrast to mHealth apps which are often free, wearables are priced at a premium, which has helped sales in this new market grow at a fast rate. Again, analyst reports on market size and growth vary widely, and it can be difficult to split out the health and fitness specific elements. According to our estimates, health and fitness wearables account for just under 30% of the total wearables market, at £1.5 billion in 2014, growing to £3.1 billion by 2018 at a CAGR of 21%.<sup>38,39,40,41</sup> We have estimated a lower growth rate for wearables than for mHealth apps as wearables may have to sacrifice some of their premium pricing in order to grow adoption past an early majority of users.

Companies driving the current growth of wearables include large fitness and electronics companies such as Sony, Nike and Samsung, and wearables-only companies such as Fitbit and Pebble. The global market for wearables is significantly more consolidated than that of mHealth apps, reflecting the greater barriers to entry and adoption for wearables (e.g. manufacturing). Development and manufacturing costs are higher, and adoption rates are lower in wearables than in mHealth apps.<sup>42</sup>

Figure 18. Global health wearables market



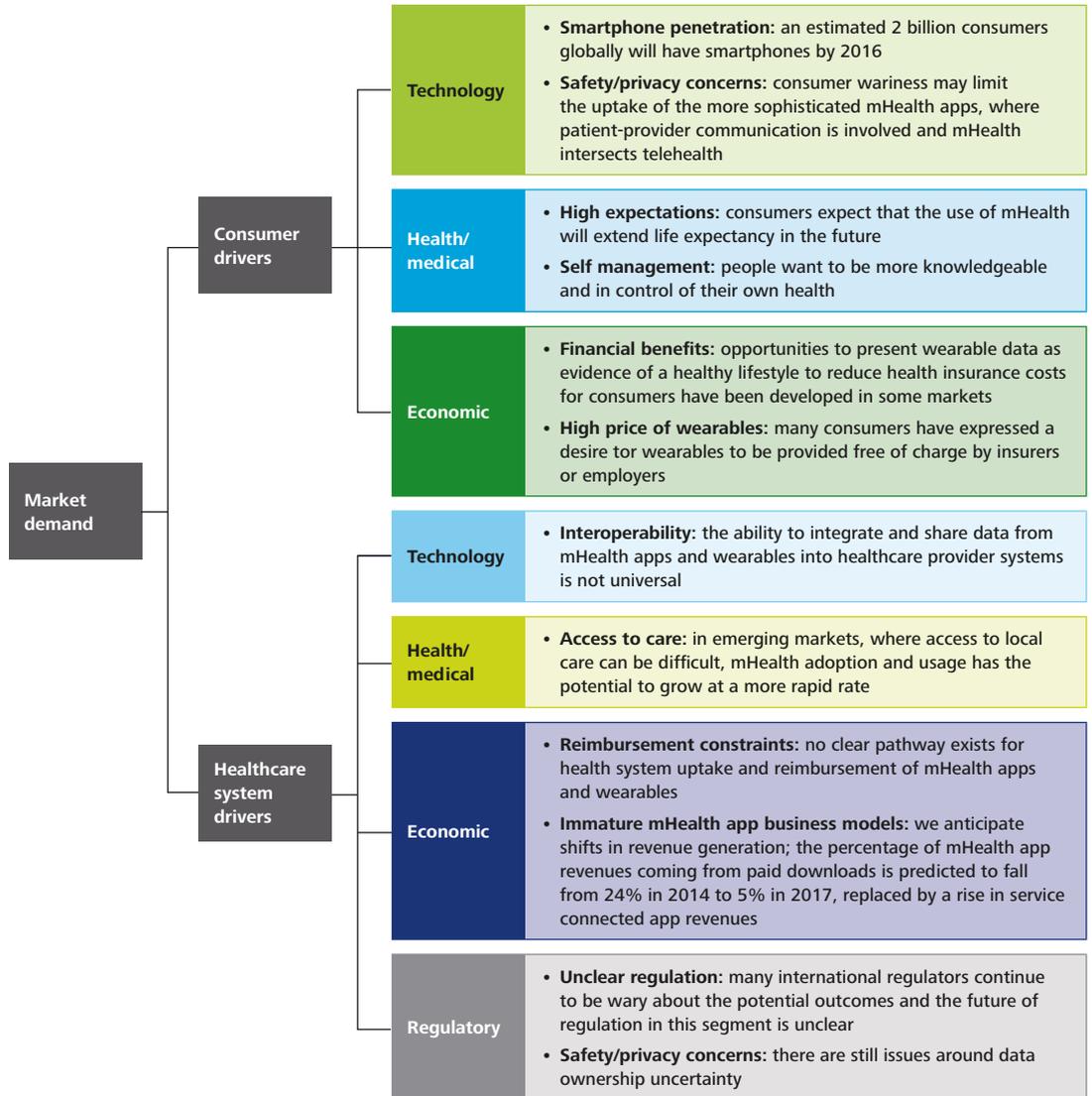
Sources: MarketsandMarkets, Technavio, Yano research institute, Karim, Mint, Deloitte research, interviews and analysis

mHealth application revenues are varied throughout the sector. Currently, only about the top 5% of mHealth apps have a total turnover of \$1,000,000 or more. Most (about 70%) of mHealth app publishers make less than \$10,000 from their app.<sup>43</sup> In 2014, revenue for mHealth app publishers came from: service sales 29%, pay per download 24%, device sales 21%, in-app advertisements 17%, in-app purchases 5%, and transactions 4%. Predictions for 2017 show growing revenues from service sales and a percentage decline in download revenues: services 69%, device sales 21%, paid downloads 5%, transactions 4%, and advertisements 1%.<sup>44</sup> With this shift, we also expect to see a trend towards more evidence-based mHealth apps in future years.

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Predictions for 2017 show growing revenues from service sales and a percentage decline in download revenues: services 69%, device sales 21%, paid downloads 5%, transactions 4%, and advertisements 1%.

## Trends driving and constraining growth



Sources: research2guidance 2014, International Journal of Scientific Research and Innovative Technology 2015, Emerging mHealth: Paths for Growth, PWC 2013

There is significant global interest in healthcare innovation through mHealth. A 2011 survey by the WHO and the Global Observatory for eHealth identified that out of 112 member countries surveyed, 83% reported at least one initiative to support sector growth; most reported at least four.<sup>45</sup>

Our analysis of the mHealth market drivers and constraints distilled two key themes. The first theme is around the current and growing demand for consumer-led mHealth apps and wearables. The second theme focuses on the barriers to adoption of clinically-led health health apps.

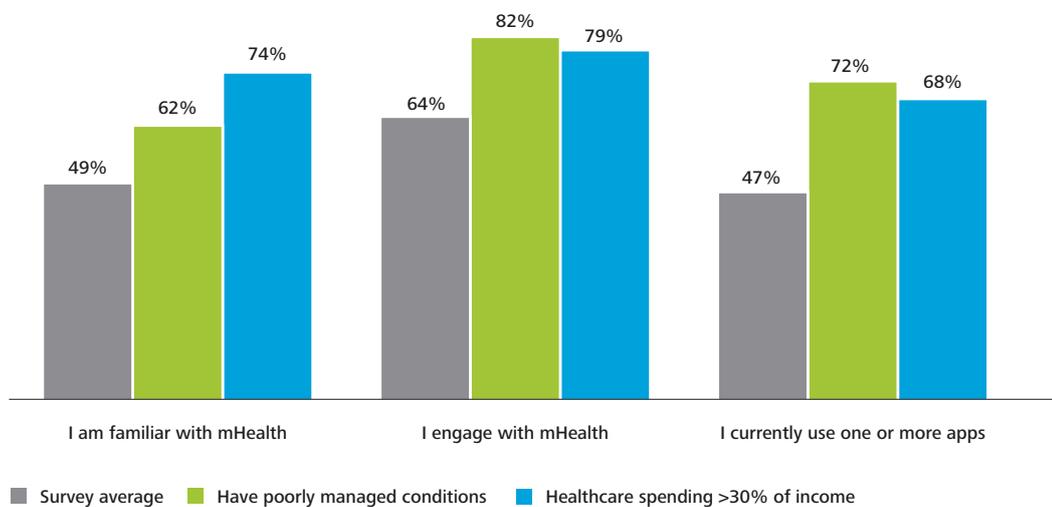
**Theme 1: the mHealth market is currently highly dependent on consumer demand**

Consumer use of mHealth is tightly linked to growing technology adoption. For example, access to a wireless connection increases the likelihood of an individual using the Internet to gather and share information: PewResearch Centre found that the proportion of mobile phone users who use their phones to look up health information almost doubled from 17% in 2010 to 31% in 2012.<sup>46</sup> Statista estimate that UK smartphone penetration is over 70% in 2015, and 76% of the British population access the internet every day.<sup>47,48</sup> Globally, a Deloitte survey found that consumers aged 35-44 were the most likely to use mHealth apps (23%). In contrast, only 7% of consumers aged 55-64 reported using mHealth apps. Overall, 48% of survey respondents said they were likely to adopt the use of an mHealth app in the next six months.<sup>49</sup>

In the UK, 50% of the population use the internet to self-diagnose with 75% going online for health information.<sup>50</sup> 80% would like to view medical records online and 90% would use a service letting you ask questions to clinicians, suggesting a high level of trust in health technology.<sup>51</sup>

Consumers have high expectations for mHealth. In particular, they believe mHealth should have significant impacts on how they seek information on health issues (59% of respondents), how providers or services send healthcare information (51%), and how overall health and chronic conditions are managed (49% and 48%, respectively).<sup>52</sup> This enthusiasm translates into high levels of adoption, particularly for patients with health problems.

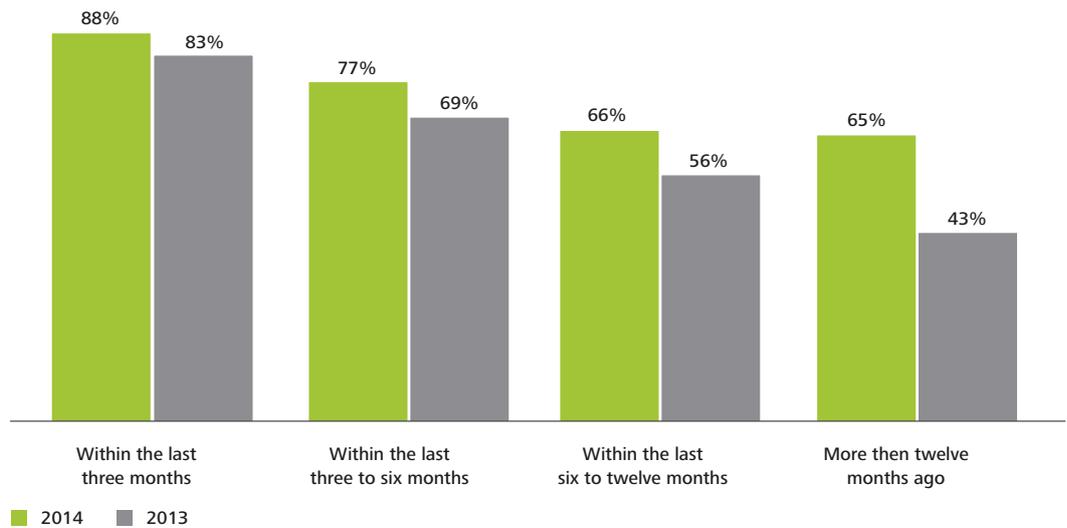
**Figure 20. mHealth survey responses**



Source: Emerging mHealth: Paths for Growth, PWC

Consumer demand for mHealth is set to increase as wearables gain traction: currently only one in five Americans and fewer Britons own a wearable<sup>53</sup> and there is a high abandonment rate with a high proportion of users purchasing a wearable device but no longer using it after 12 months.<sup>54</sup> The recent launch of the Apple Watch may help the ubiquity of wearables, and it may provide a platform for more health-focused apps linked to wearables.

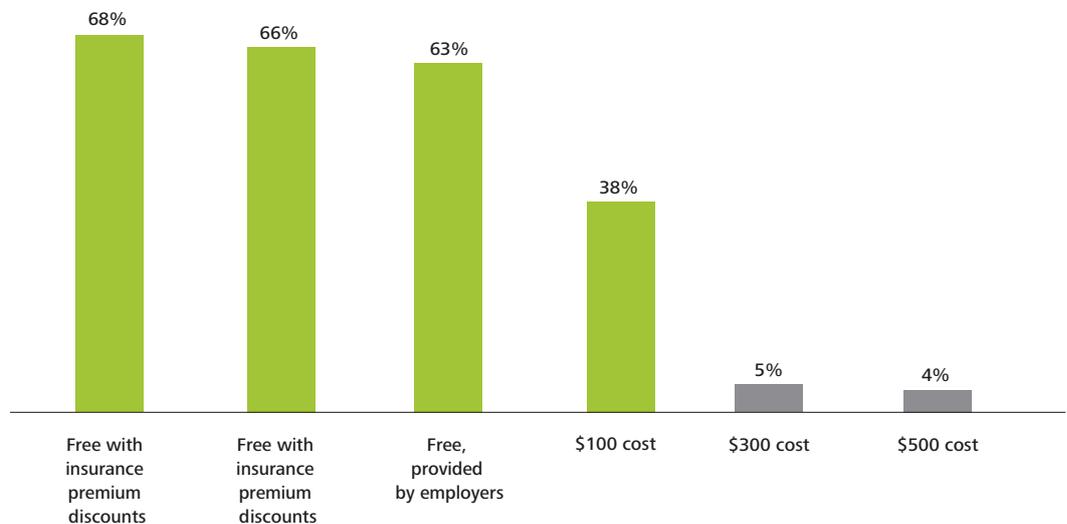
**Figure 21. Percentage of users still wearing a wearable device over a series of time periods**



Source: Endeavour Partners

Innovations such as employer or insurer-funded wearables or insurance-based incentives, for example, discounts for submitting wearable data showing an active lifestyle, may also drive adoption of wearable devices.

**Figure 22. US willingness to pay for wearables (percentage of respondents who were very/somewhat willing to purchase a fitness band)**



Source: Health Wearables: Early Days, PWC Health Research Institute, 2014

**Theme 2: Healthcare system barriers: there are several barriers to mHealth adoption and integration within health systems, impacting the public health and economic potential of the industry**

As anticipated by consumers, mHealth holds significant possibilities for improving public health. But crucially, for this effect to be felt, mHealth needs to be adopted and integrated into the healthcare system. Despite this opportunity and demand, we see a continued lack of mHealth adoption in healthcare systems for the following reasons:

*Regulatory uncertainty*

In addition to unclear reimbursement, there is significant regulatory uncertainty around mHealth apps and wearables, prompting many mHealth products to categorise themselves as fitness and wellbeing products, which is “a huge missed opportunity” according to one digital health expert interviewed.<sup>55</sup> Some markets are better at providing clear regulatory advice than others; in the US, the FDA has released guidance on the regulation of Mobile Medical Applications.<sup>56</sup> Of significance, they specified the types of health applications which would not require FDA oversight, making mHealth product development a more straightforward process. The FDA to date has approved over 100 mobile medical applications; significantly higher than most other countries.<sup>57</sup>

*Unclear approved reimbursement mechanisms*

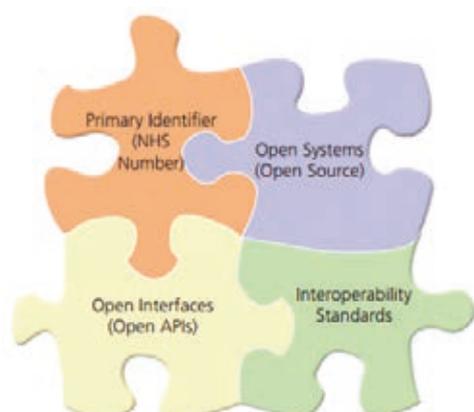
Unclear reimbursement mechanisms reduce the incentive for application developers and wearable makers to focus on the healthcare system as a customer. According to a 2013 survey by Digita Health, 90% of patients reported they would accept a mobile app prescription from their doctor, as opposed to only two-thirds of patients who reported willingness to accept a medicine prescription.<sup>58</sup> The willingness of patients adopt mHealth is not reflected in the ability of doctors to prescribe smartphone apps and wearables. In the UK, health apps can be recommended on the NHS Choices website, a process that checks their relevance, legal compliance and clinical assurance/potential for harm. This mechanism is not as well-defined as approval processes for other medical technologies, as noted by the NHS apps website: “this is new territory, we are learning as we go along”.<sup>59</sup> The reimbursement models for these apps vary greatly; some are free to use, others charge the consumer directly and some may be subsidised by local authorities.

Until there is a clear business model for mHealth, small mHealth companies are unlikely to receive high levels of investment and/or scale compared to other global companies. Although mHealth applications are an area of interest as they have low set-up costs and could be sold to larger healthcare players, this is not a model which is as well-established as it is for other types of applications such as communications (WhatsApp was sold for \$19 billion) or photo sharing (Instagram was sold for \$1 billion).

*Imperfect data connectivity and interoperability*

Data connectivity, security and privacy are additional barriers to mHealth adoption and integration. Until applications are regulated they are unlikely to have clear guidelines for use and interoperability standards. NHS England defines an ‘interoperability jigsaw’ as below, stating that these areas are all necessary to have clear data standards:

**The interoperability jigsaw**



Source: The Integrated Digital Care Fund: Achieving integrated health and care records, NHS England, May 13, 2014

The NHS number is a single way of collecting data on an individual, so that as a patient moves through the health and social care system, the right information can be available in the right place at the right time. Open application programming interfaces (APIs) create an ecosystem of applications, data and processes working together. Historically, individual application vendors have developed bespoke interfaces leaving the NHS to integrate various applications, an increasingly complex task.

Being able to meet standards and pull together the interoperability jigsaw is a long-term and challenging task. It is also hugely important. According to a recent information governance review, there were 186 serious data losses reported to the Department of Health in England from June 2011 to June 2012, with almost one third related to unauthorised disclosures.<sup>60</sup> Breaches involving technology were “often much more significant involving many records and with great potential to do harm.” On example is Brighton and Sussex University Hospitals NHS Trust which failed to properly dispose of computers containing confidential records in hard drives and was subsequently fined £325,000.

#### *Lack of stakeholder engagement*

Although there are a number of early adopters, some doctors (43%) associate the term mHealth with contact between a patient and healthcare provider by mobile phone, whereas consumers are more likely (44%) to see mHealth as a way to learn about/monitor wellness, and some would be interested in clinicians seeing these results.<sup>61</sup> Similar to the barriers for telecare and telehealth, mHealth adoption depends on delivering a clear benefit for clinicians.

#### *Lack of digital skills/urgency for change*

Finally, a lack of interest in mHealth may be related to a lack of digital skills in the patient population as well as a cultural resistance to change from the healthcare system. In 2013, there were 11 million people with low or no digital skills in the UK.<sup>62</sup> Crucially, this digital divide overlaps significantly with heavy users of the NHS: according to the Tinder Foundation, half of all people not using the internet have a disability and 36% of over 65s have never been online.<sup>63</sup> In contrast, emerging market populations may have lower technology penetration levels but there is a strong sense of urgency to adopt mHealth, which is seen as a way to deliver primary care. As in the mobile banking industry, emerging markets have used the increasingly ubiquitous mobile phone to leapfrog into mHealth.<sup>64</sup>

### UK competitive position

#### mHealth apps

Of the c. 8,000 app companies in the UK, it is estimated that fewer than 500 (c. 6%) are focused on health<sup>65</sup> and the market is highly fragmented: we estimate that the largest company in the UK accounts for only about 2% of the total market size. Average (mean) numbers of employees for app companies, including mHealth app companies, are skewed by large employers, such as established software vendors or healthcare systems. Most companies engaged in mHealth app development employ fewer than ten people, and the ratio of developers and designers to other roles (sales, marketing, etc.) is currently 1:5.<sup>66</sup>

A case study for UK-based Big Health’s Sleepio, an insomnia cognitive behavioural therapy app representative of evidence-based mHealth app services, is shown in figure 23.

**Figure 23. Sleepio case study**

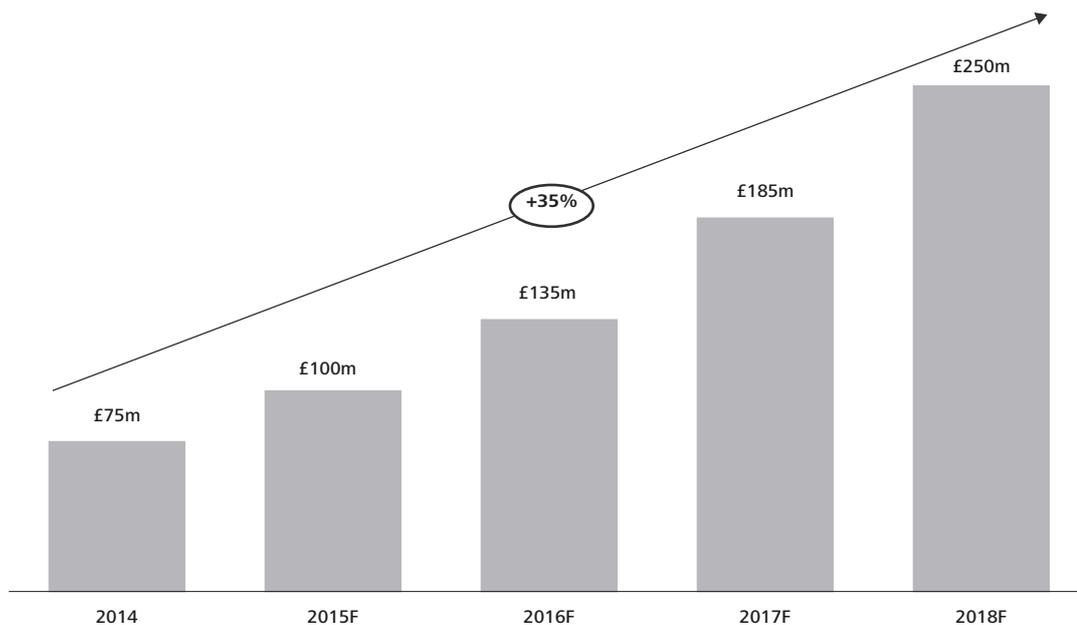
| <i>Sleepio is an example of best practice:</i>  |   |
|---|---|
|  <p><b>has strong clinical evidence</b></p> <ul style="list-style-type: none"> <li>• A randomised control trial was conducted in 2012, with positive results</li> <li>• Results were shared in peer-reviewed journals</li> </ul> |  <p><b>has a lean team</b></p> <ul style="list-style-type: none"> <li>• Est. &lt;20 employees</li> </ul>  |
|  <p><b>has a number of partnerships</b></p> <ul style="list-style-type: none"> <li>• The company has partnered with Patients Know Best, to link information with medical records, as well as Jawbone wearables</li> </ul>        |  <p><b>the owners, Big Health, raised \$3.3m in 2014</b></p> <ul style="list-style-type: none"> <li>• This was the first round of Series A funding</li> <li>• Investors stated that they believed healthcare was ‘on the brink of far-reaching change’</li> </ul> |

Sources: Big health website, indexventures.com, Deloitte analysis

### UK market growth

The UK mHealth app market was valued at £75 million in 2014, c. 3% of the global market, and predicted to grow at a CAGR of c.35% over the next three years.<sup>67,68,69</sup>

Figure 24. UK mHealth app market, 2014-2018 (£m)



Sources: BCC Research 2012, GSMA and AT Kearney 2012, Deloitte Centre for Health Solutions 2015, Mint, Deloitte research, interviews and analysis

A 2013 Deloitte survey showed that 10% of UK responders had downloaded an app to track their health, 17% had used an app to monitor and manage fitness and health improvement goals, 15% had used an app to manage health issues, 8% had used mobile technology to receive medically related alerts or reminders, and 5% had used mobile technology to send or receive a picture related to a health problem.<sup>70</sup> However, this high consumer demand does not necessarily translate into the UK holding a large market share in the global mHealth applications market. This is partly due to the majority of apps being free: 86% of iOS apps were free in 2010, compared to 90% in 2013.<sup>71</sup> Additionally, adoption of clinically-led mHealth apps within the healthcare system is constrained in the UK, partly due to a lack of reimbursement models. Interviews suggested that although the UK is a great place to develop healthcare apps, often companies go abroad to develop a sales profile, for example in US corporates.

## Wearables

The wearables market in the UK is overwhelmingly limited to large, US-based companies and a handful of smaller/start-up companies such as Fitbug, which is listed on the Alternative Investment Market (AIM).<sup>72</sup>

Figure 25. Fitbug case study

| Fitbug is an example of a UK wearable company...  |  |
|---|--|
|  <p>has a small team of 23 employees</p> <ul style="list-style-type: none"><li>• 7 administrative positions</li><li>• 8 development positions</li><li>• 5 sales positions</li><li>• 5 support and project management positions</li></ul> |  <p>is growing</p> <ul style="list-style-type: none"><li>• 2014 year-end revenues total £2.3 million; up from £749 thousand in 2013</li><li>• The company was launched in 2004</li></ul>   |
|  <p>has a number of partnerships</p> <ul style="list-style-type: none"><li>• The company has commercial partnerships with Samsung, Target, J Sainsbury, Argos, and Jawbone</li></ul>   |  <p>is analysing the data obtained</p> <ul style="list-style-type: none"><li>• Fitbug's products include wearables and apps in addition to add-on services such as health and wellbeing coaching that integrates personal data from their mHealth technologies to personalise coaching plans</li></ul> |

Source: Fitbug 2014 annual report

This market concentration may be partly driven by a more risk averse digital health investor environment in Europe than the US, meaning that small wearables companies in the UK are struggling to scale, and this is unlikely to change until other barriers identified above, such as local infrastructure and incentives, are in place to help them grow. This investment may ultimately stem more from foreign investment: for example, US-based Wearable World Labs announced the launch of an accelerator in London for European wearable start-ups in 2014.<sup>73</sup>

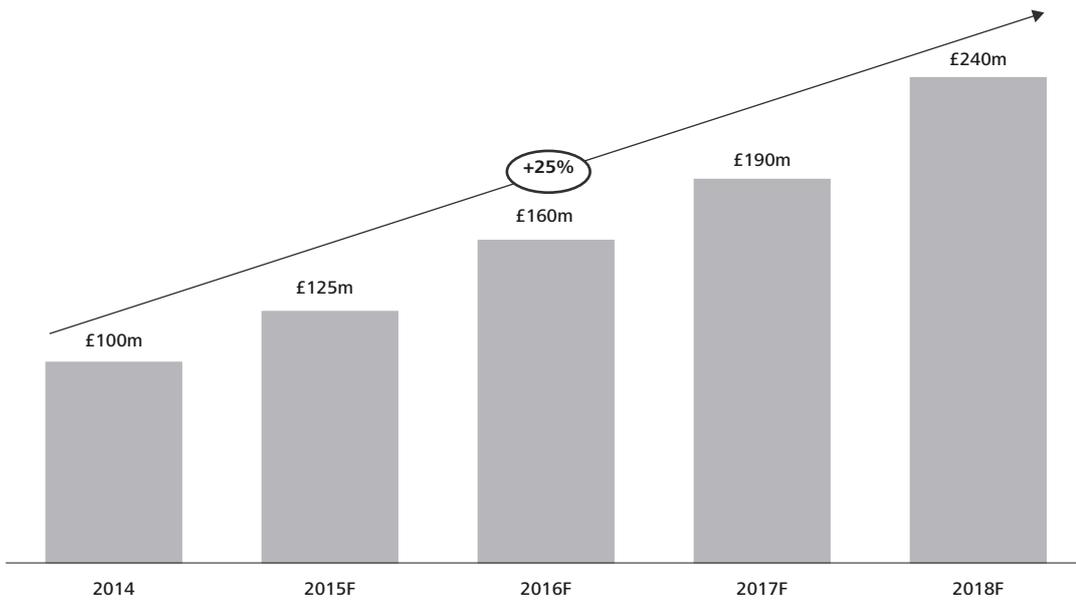
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Market concentration may be partly driven by a more risk averse digital health investor environment in Europe than the US, meaning that small wearables companies in the UK are struggling to scale, and this is unlikely to change until other barriers identified above, such as local infrastructure and incentives, are addressed. are in place to help them grow.

### UK market growth

Consumer adoption of wearables in the UK is on par with other developed countries, and estimates suggest that up to £375 million have been spent to date on health and fitness apps, smart watches, running bands and other similar devices in the UK. The total UK market size is estimated to be c. £100 million in 2014, 7% of the global market.<sup>75,76,77,78</sup>

Figure 26. UK mHealth wearables market, 2014-2018 (£m)



Sources: Kantar Media 2014, Technavio 2013, Yano research institute 2014, Karim 2014, Mint, Deloitte research, interviews and analysis

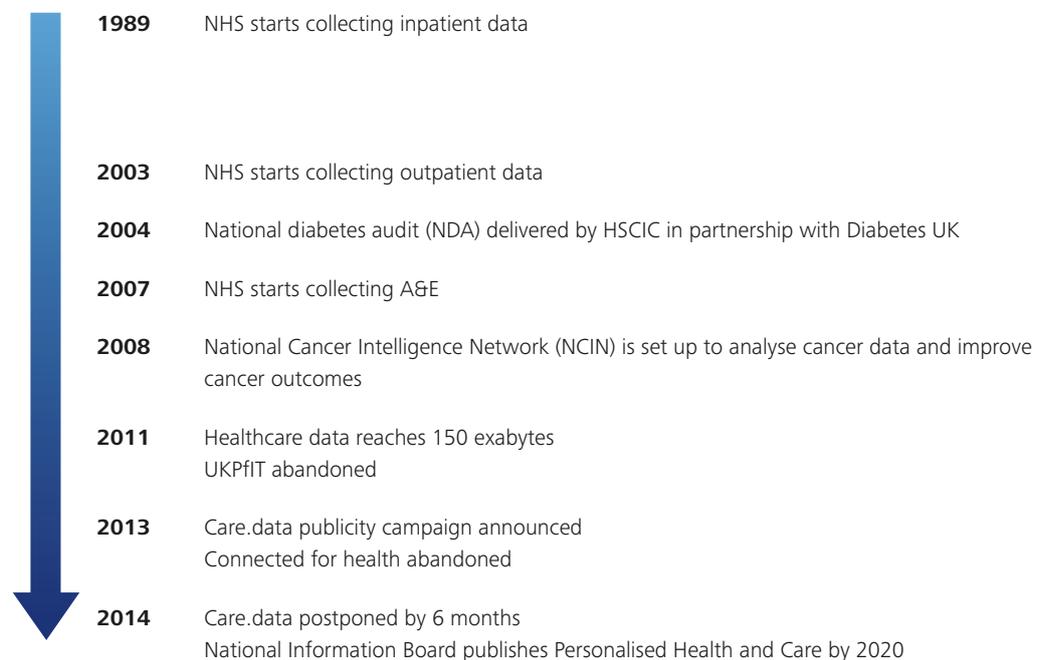
Currently 6.7 million Britons are wearing a health and fitness device, and this could increase to 13.1 million over the coming year, with 7% of consumers using both an app and a wearable device.<sup>79</sup> Of the current consumers, 90% measure their progress using free software, highlighting the different business models used in these two mHealth sectors. Therefore, we estimate the wearables market will grow at c. 25% per annum in the near term, assuming some category expansion, a more conservative estimate than other market predictions, but we believe that barriers to market entry and adoption will constrain growth below app market growth rates.

# Part 4. Data Analytics

Big data is often defined as “*datasets whose size is beyond the ability of typical software tools to capture, store, manage and analysis*”.<sup>80</sup> Big data analytics is defined as the software solutions required to assimilate big data. This covers a wide variety of areas including: Data mining, advanced analytics and data visualisation.

Healthcare and life sciences are among the biggest impact industries in the UK that use big data. Healthcare data is collected from a variety of different sources. The NHS has been collecting patient data since 1989, and adds 19 million inpatient records, 90 million outpatient records and 18 million A&E records per year.<sup>81</sup> Data can also be collected from commercial sources, such as data from apps and wearables in the mHealth sector, which continuously collect data on their user.

**Figure 27. UK analytics industry timeline**



Sources: ABPI 2013, Deloitte analysis

The true value of data analytics is in the insights produced and applications these insights are used for. In healthcare, these applications include:

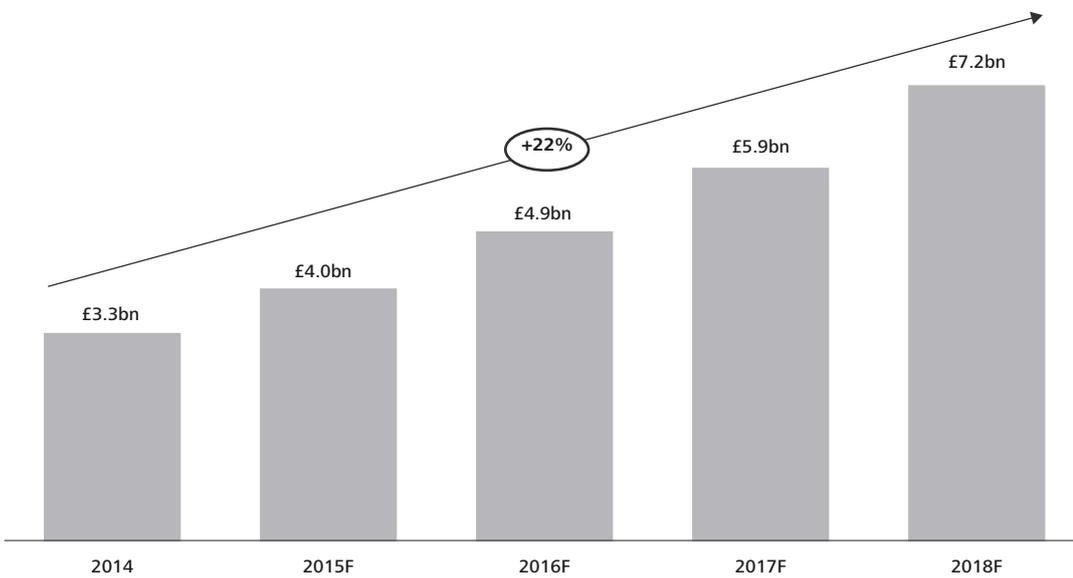
- **Clinical decision making:** enabling clinicians to make evidence-based clinical decisions about patient care.
- **Pathway design:** using population level analysis to help redesign clinical pathways.
- **Commissioning:** developing standard frameworks and models for innovative commissioning/funding using patient outcomes and resource utilisation data for new and existing treatments.
- **Drug assessment:** the long term use of real world evidence to support drug development and approval.
- **Performance management:** prioritising resource allocation and measuring key performance metrics to better manage finances within the healthcare system.
- **Evidence based learning:** using analytics to more effectively share best practice.

### Global market size and growth

The global healthcare analytics market was worth up to £3.3 billion in 2014 based on triangulations of various data sources:<sup>82,83,84,85</sup> the industry is relatively new and historical data is limited. The market has grown rapidly, due in part to government mandates, particularly in the US where healthcare providers have been incentivised in recent years to increase adoption of electronic health systems and health analytics.

Market forecasts are in consensus that the healthcare analytics market will continue to grow at a rapid pace of c. 22% from 2014-2018, reaching a global market size of £7.2 billion in 2018.

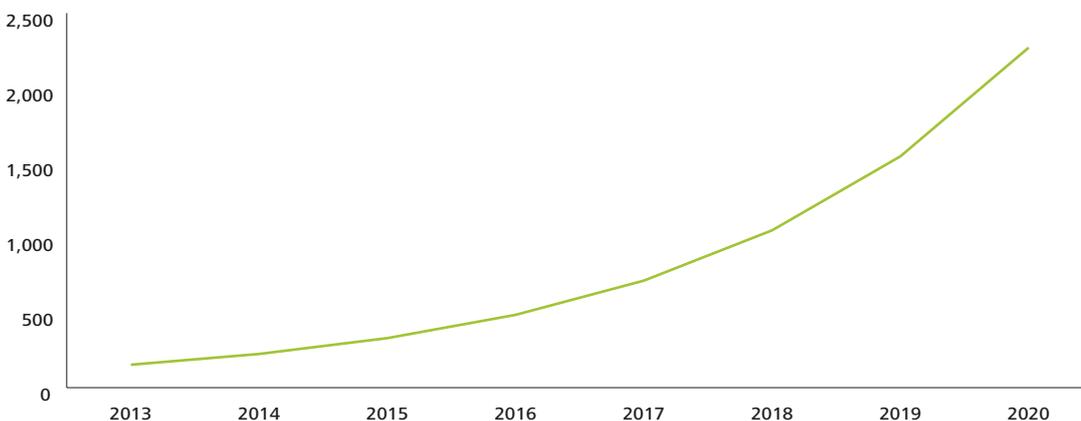
Figure 29. Global healthcare analytics market 2014-2018 (£bn)



Sources: Markets & Markets 2015, Research Fox 2014, Transparency research 2015, Deloitte research, interviews and analysis

The market will evolve as global data volumes are predicted to rise at an exponential rate: from 2013, volumes of data globally are expected to rise from 153 Exabytes (2<sup>60</sup> bytes) to 2269 Exabytes in 2020, a CAGR of 47%.<sup>86</sup>

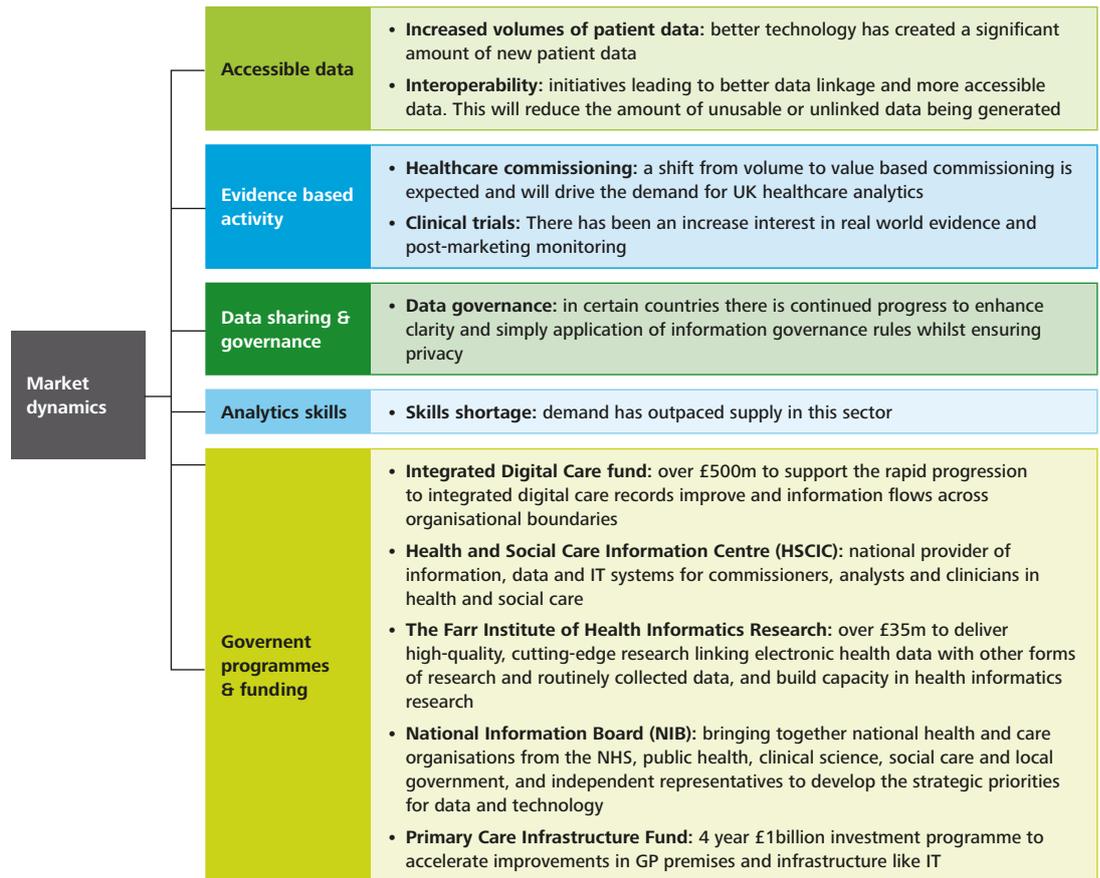
Figure 30. Global healthcare data volumes (Exabytes)



Source: SAS Institute 2011

The global market is led by US companies, including Cerner Corporation, McKesson Corporation, Optum, Oracle, IBM and Truven, which account for c. 70% of the market. The remaining c. 30% of the market is more fragmented and populated by smaller and/or regionally based companies.

### The trends driving and constraining growth

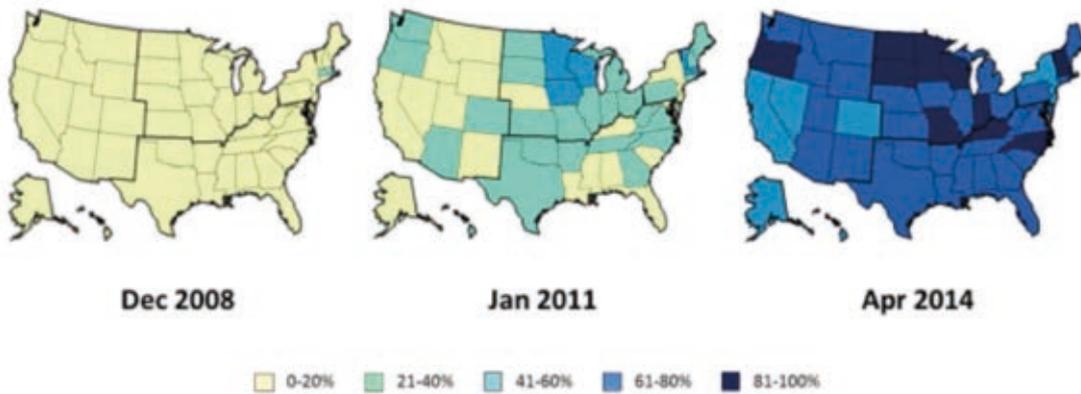


The healthcare analytics space has grown considerably over the past years as healthcare moves from a volume to value-based service industry. As ageing populations and high incidence of chronic conditions increase healthcare costs, payers and consumers are seeking improved outcomes and better value. Healthcare analytics is seen as an important capability to achieving these goals.

#### *Theme 1: Technology adoption by healthcare systems and consumers has allowed for the collection of big data, but data access remains a key challenge*

Healthcare systems around the world have become increasingly digitised over the last decade. Much of this has been encouraged by government initiatives: for example, in the US, the Health Information Technology for Economic and Clinical Health Act (HITECH) provided upfront incentives for investment in digital solutions, and reward incentives for providers who could demonstrate their efforts in using EHR technology. The programme resulted in quadrupled hospital adoption of basic EHR systems since 2009, from 12% to 59%, and hospitals possessing certified EHR technology rose from 72% in 2011 to 94% in 2013.<sup>87</sup>

**Figure 31. Percentage of physicians e-prescribing using an EMR through April 2014, by state**



Source: Office of the National Coordinator for Health Information Technology, 2015

The UK envisions a paperless NHS by 2018.<sup>88</sup> This would be a significant data source as the NHS maintains 60 million patient records across primary, secondary and tertiary care.<sup>89</sup> Consumer technology adoption is also a key driver of health analytics, as the rise in use of smartphones, health apps, wearables and social media generate health data collection possibilities. The quality and availability of standardised open data sets is also improving with the setting up of the Health and Social Care Information Centre (HSCIC) and the proposed creation of care.data, the initiative to upload data from GP records to the HSCIC databases.

However, data access still remains a significant barrier to using the rich data sources across the healthcare system and between organisations (in both the public and private sector). It will be important that government initiatives such as the National Information Board (NIB) and HSCIC continue to develop and implement practical solutions that ensure privacy and engage all relevant stakeholders. Significant progress in data access will be critical to generate value for the UK's data assets.

***Theme 2: incentives and value-based commissioning is a key driver for the use of data analytics by healthcare systems***

Within healthcare systems, the role of healthcare analytics is driven by direct incentives and the move to value-based or outcomes-based commissioning, a shift that is still in its infancy in the UK. Traditional commissioning focuses on processes and inputs, whereas value-based commissioning is a way of paying for health and care services based on rewarding the outcomes for the patient.

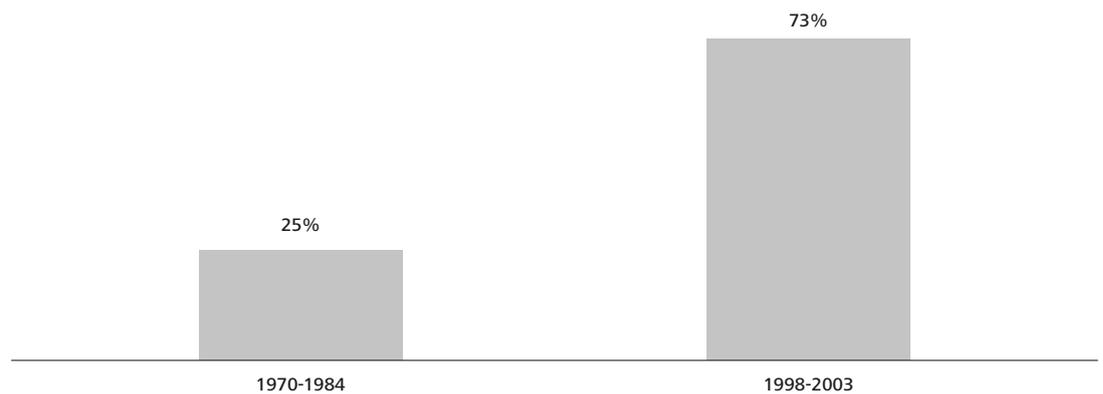
In the US, incentives and the use of analytics to demonstrate superior outcomes has accelerated the adoption of health analytics. Accountable care organisations are reimbursed based on quality improvements and cost of care reductions, and financial incentives are determined by comparing the organisation's annual incurred costs and quality of care to benchmarks established by the Centres for Medicare and Medicaid Services.<sup>90</sup> Patient data is combined with medical studies; these recommendations are sent to doctors and hospitals as information alerts. Doctors have not only taken on recommendations, but also started to send more requests to informatics departments.

### Theme 3: pharmaceutical companies are seeing the benefits of data analytics

Pharmaceutical companies have begun to use data analytics across the value chain from R&D to post-launch activities. A combination of the need to drive returns on R&D and an increased emphasis on drug effectiveness and trial transparency has increased the interest in real world data analytics.

Declining returns on R&D have been driven by a number of factors, including the patent cliff: in 2012, \$38 billion of worldwide prescription drug sales were lost as a result of expired patent protection.<sup>91</sup> At the same time, the cost of developing a new drug than gains market approval has risen 145% since 2003 to an estimated \$2.6 billion in 2013.<sup>92</sup> Real world data analytics holds promise in improving predictive modelling of biological processes, real-time trial monitoring to identify key actions to reduce costly adverse events or even better identification of patients to enrol in clinical trials. This comes at a time when there is an increasing demand for surveillance of new drugs: real world evidence provides an opportunity to draw significant value from post-marketing monitoring.

**Figure 32. Percentage of FDA approved drugs requiring post-marketing monitoring**



Source: EFPIA position paper, 2004

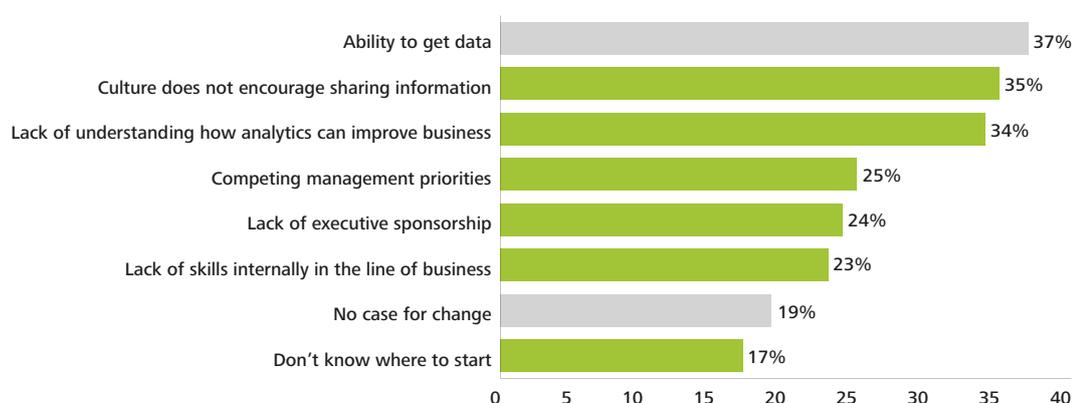
Health analytics may also offers an opportunity to show the benefits of a drug in the real world rather than trial settings, and pharmaceutical companies are using health analytics to demonstrate the value of new therapies for the healthcare system. Due to healthcare budget constraints, this requirement is becoming more prominent. For example, the Pharmaceuticals Market Reorganisation Act (AMNOG) in Germany, launched in 2011, allows drug reimbursement prices to be reset 12 months after a new product launch, following an assessment of the clinical benefits provided by the manufacturer.<sup>93</sup> In the UK post-launch outcomes are likely to be a requirement of early access schemes. However, the potential for health analytics in these areas has yet to be realised.

**Theme 4: there are cultural and skills based challenges to the successful use and implementation of data analytics in healthcare**

Whilst there are many opportunities to use healthcare analytics, there are a number of cultural/organisational and capability barriers that prevent the full potential value being realised.

When asked about the primary obstacles to widespread analytics adoption, organisations gave a number of reasons related to organisational attitudes<sup>94</sup> (shown in green below):

**Figure 33. Primary obstacles to widespread analytics adoption**



Source: MIT Sloane/IBM, 2011

Creating a data driven culture in the NHS is the aim for enhancing healthcare analytics. There are some examples of data analytics being adopted and adding value, such as the optimisation of organ donations for NHS Blood and Transplant,<sup>95</sup> however implementing sustainable change throughout primary, secondary and tertiary care, and all the surrounding organisations will remain challenging. Building a digital leadership academy may help address this issue and contribute to developing a common view on the value and relevance of healthcare analytics.

Another key barrier is the skills gap: health analytics requires workers with both analytics and health experience and knowledge. One global survey found that 46% of respondents quoted staff shortages as the most common barrier to analytics.<sup>96</sup> According to a report by the SAS institute, there was a tenfold increase in demand for big data staff across the UK between 2008 and 2013, and a 41% increase in the number of big data jobs posted online between 2012 and 2013.<sup>97</sup> The mismatch between demand and supply is compounded within healthcare, where complex data analysis is often outsourced: for example, Wolfram Research is partnering with London South Bank University to analyse nursing data for University Hospital Coventry & Warwickshire NHS Trust to help the hospital predict when, where and how to deploy its staff.<sup>98</sup>

Closing the resource gap would address a critical barrier to faster rollout of digital solutions across UK healthcare.

### UK competitive position

Currently the health analytics market is relatively small with a number of start-ups companies and departments within large consulting and IT firms.

Figure 34. UK Analytics SME profile



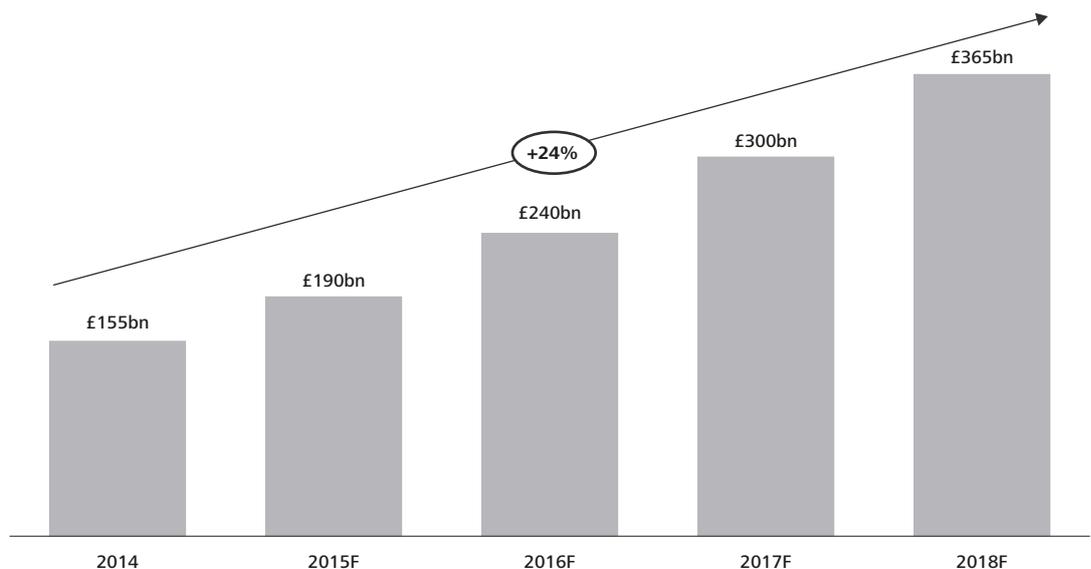
Source: Deloitte analysis

Across government there are multiple organisations operating in the analytics and data sector including the Health and Social Care Information Centre (HSCIC), the Clinical Practice Research Datalink (CPRD), the Farr Institutes, and care.data

### UK market growth

The UK accounts for c. 7% of the global healthcare analytics market at c. £155 million in 2014.<sup>99,100</sup> We estimate that the UK market will grow at c. 24% CAGR to £365 million by 2018, if the issues identified are addressed.

Figure 35. UK analytics market 2015-2018 (£m)



Sources: Markets & Markets 2015, Research Fox 2014, Transparency research 2015, Deloitte research, interviews and analysis

The UK market is relatively immature but will grow at a faster rate than the global market due to the strong underlying base the UK has developed, provided recent government initiatives to overcome barriers are successful.

# Part 5. Digitised health systems

A digital health system encompasses a wide array of technical capabilities from network infrastructure to data storage and exchange. This report examines the information technology systems for storage and exchange of patient health records, including:

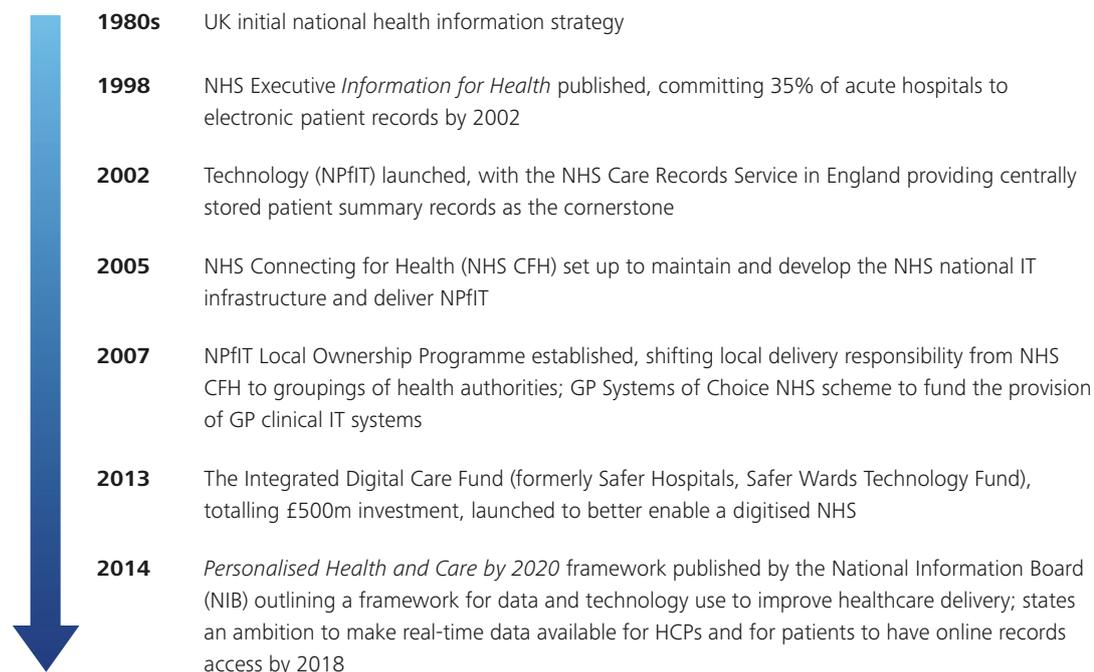
- patient held digital records;
- provider held electronic medical records;
- electronic health information exchange (including patient portals and electronic provider-provider communication); and
- e-Prescribing.



In the UK, there have been a number of high profile government initiatives to spur the digital health system market. These actions led to early and considerable user penetration, with over two-thirds (68%) of GPs in the UK having multifunctional health information technology capabilities and 97% having some form of more basic Electronic Health Records (EHR) by 2012.<sup>101</sup>

However, penetration in acute care settings lags behind.

**Figure 36. History of digitised health systems in the UK**



Sources: National Information Board, Department of Health, NHS England, HSCIC, NHS Information Authority – ERDIP Report 2001, BMJ 2010

Traditionally, providers have had concerns around implementing EHR systems, such as apprehensions about start-up and maintenance costs, uncertainty about investment yield, hesitant physician attitudes, and training and other overhead associated with IT personnel support.<sup>102</sup> Government initiatives have helped correct the market failure arising from provider apprehensions. Prior to such government intervention, EHR uptake was slow to progress in the US. In 2009, the Health Information Technology for Economic and Clinical Health Act (HITECH) was passed, which led to rapid growth of EHR use in the US. HITECH's goal was to help support and encourage US providers' adoption of EHRs. In addition to creating support for technical assistance and human resources, the act generated financial incentives (and eventual penalties for noncompliance) for this nationwide advancement of health information technology, allocating USD \$27 billion in funds over a 10-year period for this purpose.<sup>103</sup>

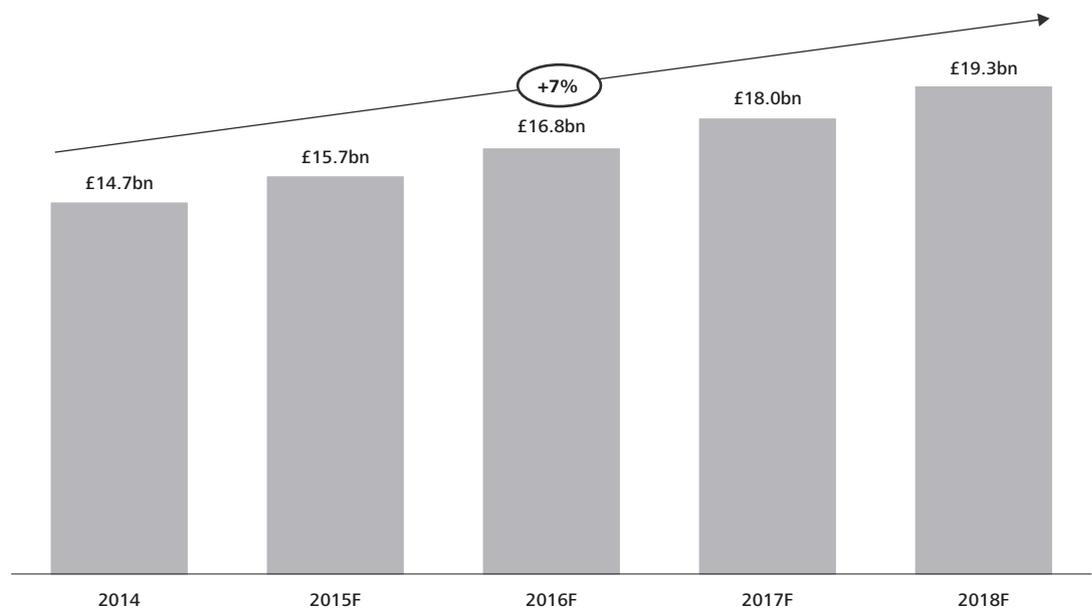
### Global market size and growth

The global digitised health system market amounted to c. £15 billion in 2014.<sup>104,106,106</sup> The market has grown at a CAGR of c. 10% over the last several years, driven disproportionately by the US with the rapid uptake of EHR systems after the adoption of the 2009 HITECH act.

In terms of future growth, analyst forecasts place global industry annual growth at rates between 5% and 10%, with more rapid growth in the US and Asia versus the more mature European markets. Government incentives will continue to play a large role in the adoption of digitised health systems. Developing countries will afford an opportunity for innovation and expansion in the years to come, whilst updating and replacing outdated infrastructure will be a major driver in the more mature markets. Finding solutions to data handling and interoperability will challenge the market in the short-term.

Given the significant challenges to maintaining current growth rates, we hold a relatively conservative view of the near-term market growth. Over the next five years, we expect the overall global market to grow at a CAGR of about 7%.

**Figure 37. Global digitised health system market 2014-2018 (£bn)**



Sources: Accenture 2010, Kalorama information 2015, Transparency Market Research, 2014, Deloitte research, interviews and analysis

Large US companies account for approximately half of the global market size. Given the industry's significant barriers to entry, the US is expected to continue to lead over the coming years.

Cerner Corporation is by far the largest global player, followed by McKesson and Epic. Cerner connects people and systems at more than 18,000 facilities globally.<sup>107</sup> In February 2015, Cerner acquired Siemens Health Services, the health IT business unit of Siemens AG for £845 million (USD \$1.3 billion). With this acquisition, Cerner will increase its global revenues (currently split between 87.4% domestic and 12.6% globally for Q1 2015), and added over 5,000 employees to its already large 16,000-person workforce.

### The trends driving and constraining growth



Sources: Journal of Medical Systems 2012, Deloitte research, interviews and analysis

### Theme 1: Government initiatives will continue to drive the market, as short term ROI remains often unclear and investment requirement is significant

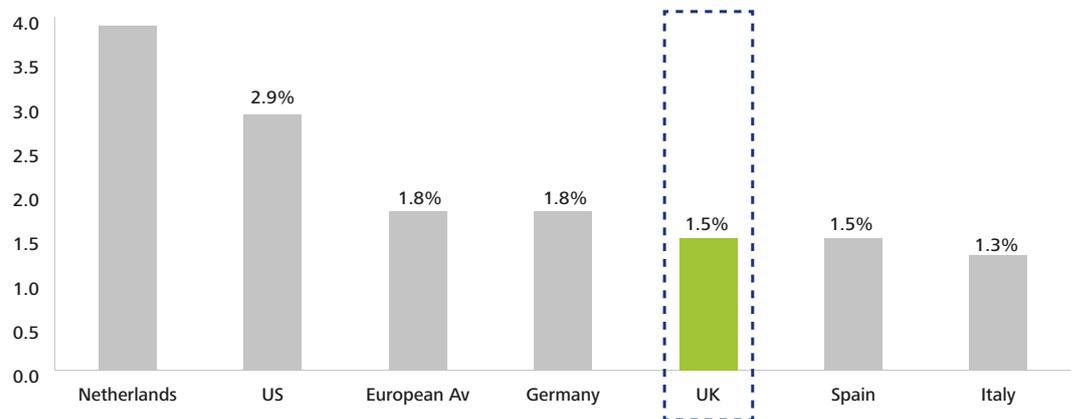
There is evidence to suggest appropriate use of digitised health systems improves quality of care through better compliance with clinical guidelines (e.g. decision support and clinical reminders for preventative care) and decreases in adverse events from medications.<sup>108</sup> Electronic health information technology has been shown to decrease operating costs from record storage and related staffing needs, reduce utilisation of health services (including laboratory and radiologic testing), and increase provider productivity (albeit after an initial period of adjustment and process redesign).<sup>109</sup>

However, there is a relative paucity of cost-effectiveness data available, which inhibits confidence in investing in the initial outlay of implementation. Another factor which hinders ROI is the cost of staff training, change management and other services related to implementing wide-scale change across NHS organisations. It is estimated that for every £1 spent on clinical software solutions, more than £1 is spent on the associated staff and change-related elements.<sup>110</sup>

In the UK, growth in the digitised health system market is expected to come mainly from acute care providers as the primary care market is well penetrated. The NHS is moving from a centralised procurement process for technology to local trust-level procurement: in October 2015 and July 2016, NHS National Programme for IT (NPFIT) contracts expire and a number of hospital trusts are expected to upgrade their systems; this will be an opportunity for them to install more integrated solutions or move towards a fully integrated paperless system. In addition, according to some interviewees, those trusts that were waiting for a streamlined NHS EHR system have significantly underinvested in healthcare IT and are looking to switch to an electronic medical records provider in the near future.

The UK currently spends less on healthcare IT in hospitals than the US and other European countries, with 1.5% of total hospital spend going on healthcare IT compared to 1.8% across Europe on average. Based on experiences in the US in secondary care and in the UK in primary care, managing government initiatives will be important for digitised health system implementation.

**Figure 38. Estimated Healthcare IT spend as a percentage of total hospital spend, 2013 (%)**



Sources: "The EMR adoption model: relationships between IT adoption, patient safety and performance", HIMSS Analytics Europe 2013; Deloitte interviews and \*analysis based on a random sample of 9 hospitals and triangulation with the total secondary care expenditure

***Theme 2: Delivery of significant benefits of IT invest regimes changes to clinical practice and effective change management***

Current evidence suggests that for every £1 in technology solutions there needs to be an additional £1 in education, redesign of key processes & change management. As with other areas of digital health, several interviewees noted a labour shortage in health information technology specialists which is challenging the growth of the industry and the realisation of benefits.

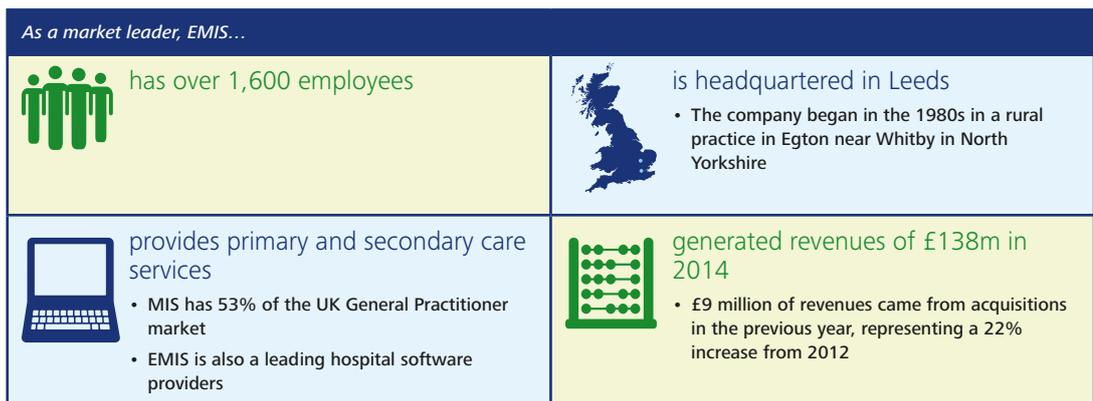
### UK competitive position

EHR use in the Western European markets is relatively well-established, led by Norway and the Netherlands. 97% of GPs in the UK claimed to use electronic medical records in the UK, up from 96% in 2009. This figure, however, is lower for hospital trusts where only 50% were using electronic clinical records.<sup>111</sup>

In 2014, 75% of UK general practitioner (GP) clinical IT systems were provided and funded through the GP System of Choice (GPSoC) framework which allows GPs to choose from a selected list of system providers.<sup>112</sup> Whilst providing consistency and price competition to the NHS, the GPSoC has also had a significant impact on the industry characterisation, which has become heavily consolidated. This is particularly noticeable in principle GP clinical systems, which is dominated by EMIS, In Practice Systems (INPS), TPP and Microtest.

The typical digitised health system company in the UK is large, with many having global headquarters outside the UK. In secondary care, EHR specialists often grow and scale in the US before selling to the UK (e.g. CSC, McKesson and Cerner). In primary care, EMIS is the largest UK-headquartered parent company; in 2014 revenues of £137.6 million were divided amongst primary and community care (65.2%), community pharmacy (13.4%), and secondary and specialist care (21.4%).<sup>113</sup>

Figure 39. Deep-dive on EMIS



Source: EMIS annual report, OneSource

In 2014 revenues of £137.6 million were divided amongst primary and community care (65.2%), community pharmacy (13.4%), and secondary and specialist care (21.4%).

### UK market growth

The UK digitised health system market amounted to c. £1.3 billion in 2014, representing c. 9% of the global market and 30% of the European market.<sup>114,115,116,117,118</sup> We estimate the UK digitised health system market has been growing at a CAGR of 8%, slightly more than the global rate of 7%, to reach a market value of £1.3 billion in 2014.

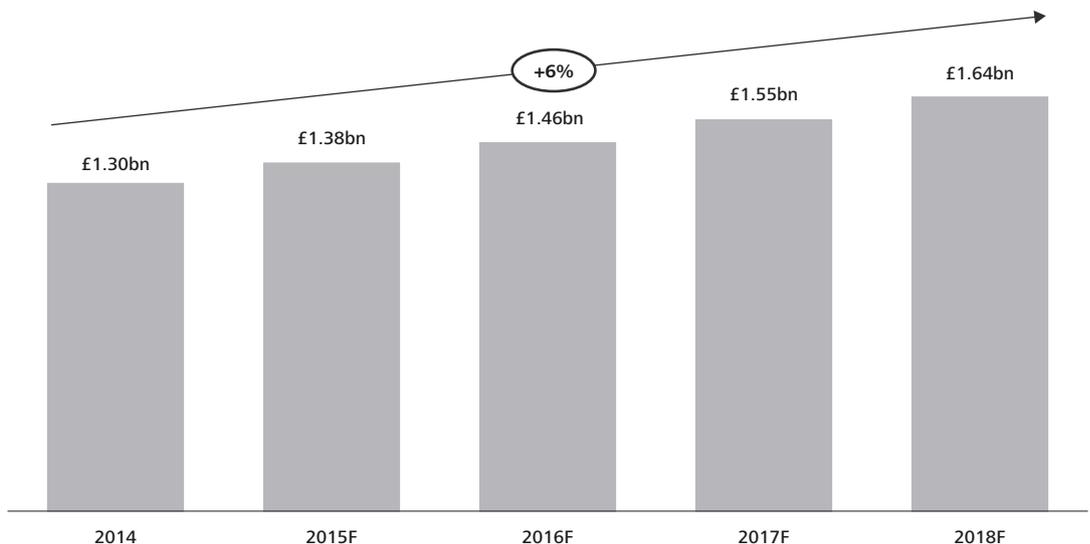
Historically, growth has been driven by government initiatives for initial adoption, and then secondarily by refreshing of systems in the near-term. The European market has not been growing at quite the same rapid rate as the Asian market where new implementation has been driving growth. However, the American market may see slower growth as electronic health record adoption grew significantly over the last few years as a result of the HITECH act, and the majority of systems will stay in place over the coming years.

Going forward, we conservatively expect the UK market to slow 6% per annum in line with the global trend, driven by the acute care market which will see significant NPfIT replacements and a high number of new hospital trusts adopting electronic medical records over the next few years. We have triangulated our market size against the estimated number of trusts using electronic health records over the coming years based on contract expirations and assuming the bottom quartile of trusts in terms of the clinical digital maturity index will start to move toward electronic health records. Individual hospital contracts are significant and can last between 5-10 years, valued from £30 million up to £100 million.

The pace of growth may be slower or faster than our 6% estimate based on three factors:

1. speed of board and regulatory approvals for business cases
2. any change in central government policy or funds
3. trust merger or devolution activity.

Figure 40. UK digitised health system market 2014-2018 (£bn)



Source: Logica 2012,, Accenture 2010, Transparency Market Research 2014, Tech UK 2014, Kalorama information 2015, Deloitte research, interviews and analysis

Overall, the need for innovative solutions to the healthcare funding crisis will drive continued growth in the digitised health market. However, tempered with the challenges posed above and a more established market, we expect slower rates of growth in the next few years to come until the regulatory, data and technology concerns are fully addressed.

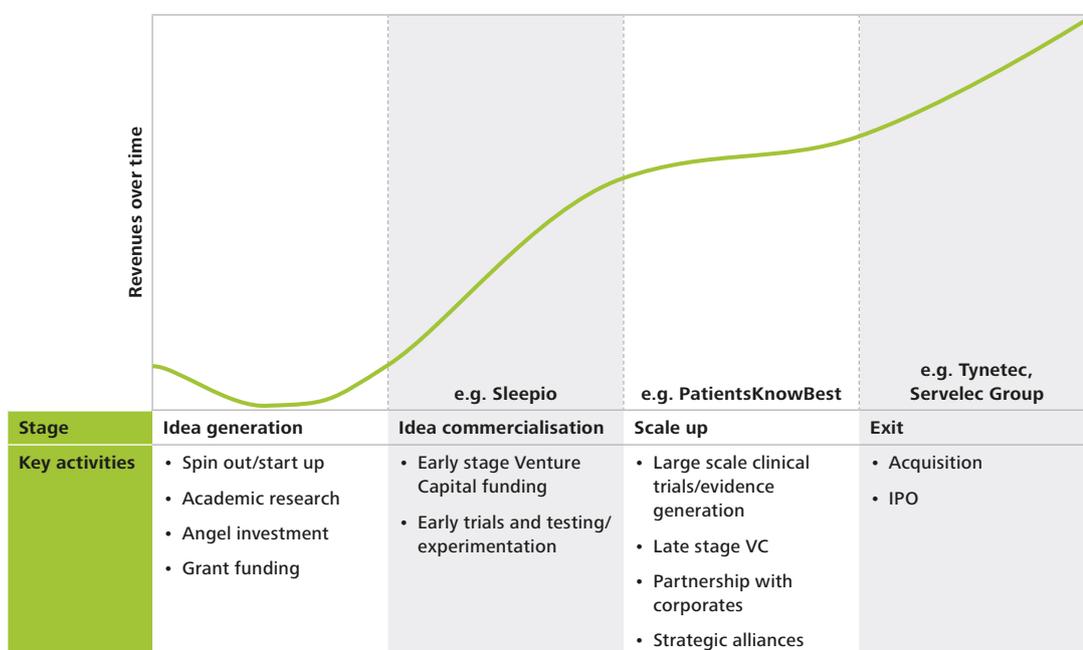
# Part 6. Conclusions on the digital health UK competitive position

The overarching theme from this study is that the UK is strong in many elements of digital health and has the potential to develop into a global leader in this segment, if certain barriers are overcome. The UK is the current leader in telecare, although this industry segment faces slower relative growth and potential for disruption. The UK is acknowledged as a good development environment for mHealth apps<sup>119</sup> and there is significant further potential in health analytics.



In order to assess the relative strengths and weaknesses of the UK's digital health industry, it is helpful to consider the start-up cycle. Companies starting up in business follow a path from developing their idea, through early-stage funding, often from venture capitalists, scaling up in partnership with corporate investors and finally exit through IPO or acquisition.

Figure 41: Illustrative start-up financing cycle



Source: Deloitte analysis

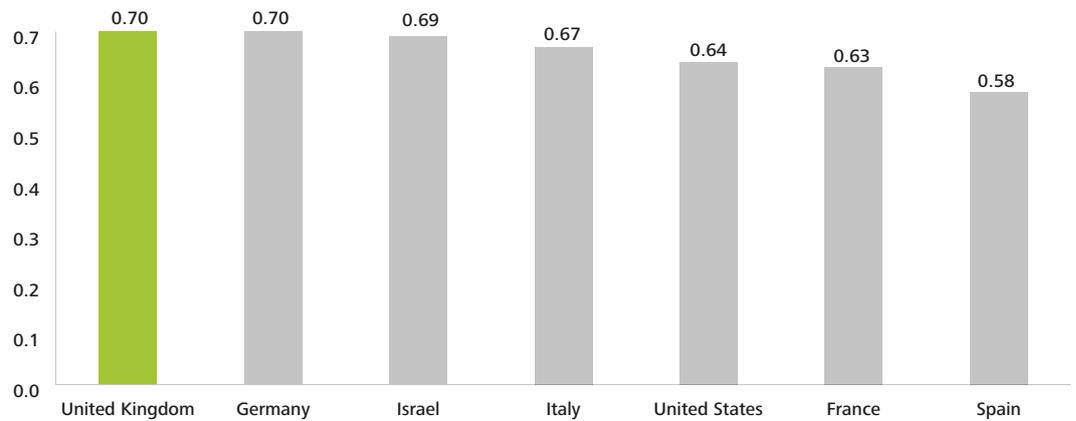
The UK is acknowledged as a good development environment for mHealth apps and there is significant further potential in health analytics.

To understand the UK's competitive position we will look at each of the four stages identified 1) idea generation 2) idea commercialisation, 3) scaling business and 4) exit.

### 1) Idea Generation

The UK is well-recognised around the globe for its strength in academic research, as demonstrated by the publication citation rate below.<sup>120</sup>

Figure 42. Average number of citations/document (2013)



Sources: SCImago Journal Rankings (2013), Deloitte analysis

This reputation is built on the world-renowned universities in Cambridge, Oxford and London, forming the GMEC cluster or "Golden Triangle," as well as the medical schools and scientific research institutes located across the country. The United States is the main competitor for academic research: of the top ten universities in the Times Higher Education World Reputation Rankings in 2015, eight were from the US, including Harvard at number one, with Cambridge and Oxford making second and third place respectively. This view was supported by a number of interviewees:

*"The UK is good at early stage research and spotting opportunities"*

Partner, Healthcare Investment Co

*"The UK punches well above its weight in academic research"*

Director, Catapult

To support and build the UK's academic research base in the digital field, in July 2015, the UK government confirmed funding for six new multidisciplinary Digital Economy research centres. The £23 million investment will come via the Engineering and Physical Sciences Research Council (EPSRC) and will support the centres over the next five years. The centres will be hosted by the Universities of York, Bath, and Nottingham, Swansea University, UCL and Newcastle University and will draw in substantial support and leverage from over 150 engaged partners including universities, companies and other regional bodies such as Local Enterprise Partnerships and Councils.<sup>121</sup> Another example is the Digital health Institute led by the University of Edinburgh in partnership with NHS24, Philips, Vodafone, IBM and Cisco. New academic courses in the field are also being launched, such as the MSc in Telehealthcare offered by Glasgow Caledonian University.<sup>122</sup> The UK has a distinct advantage over other countries in having a single provider of healthcare, which creates a valuable data environment: the NHS has been collecting patient data since 1989. With appropriate data governance in place, this could be a rich source of idea generation. As a result the UK has an opportunity to become a world leader in healthcare analytics, building on our strong research and academic base combined with the single provider of healthcare and a willingness to develop the industry.

## 2) Idea commercialisation

The UK has a good ecosystem for driving growth in early-stage start-up companies in the health space. A number of government and other initiatives provide funding, such as Small Business Innovation Research (SBIR) awards, the Wellcome Trust's Health Innovation Challenge Fund, i4i programme and Smart grants from InnovateUK. In 2013 the Welsh government launched the £9.5m Health Technology and Telehealth Fund which is aimed at supporting technology innovation in the healthcare environment. In addition to government incentives, venture capital is an important source of funding for growing digital health companies. In addition, incentives such as Enterprise Investment Scheme (EIS) and the Enterprise Investment Scheme (SEIS) offer tax breaks on investments in small companies.

mHealth is one area of digital health that is attracting significant venture capital funding globally. In the US, healthcare IT and digital health companies attracted \$784 million in funding in the first quarter of 2015; 36% of this was by mHealth companies.<sup>123</sup> UK-based mHealth companies are also benefiting from this interest: London-based digital health start-up, Big Health, secured \$3.3 million Series A funding from Index Ventures and Forward Partners in April 2014 for its digital sleep improvement program, Sleepio.<sup>124</sup>

The UK has an inherent strength in some of the underlying technology in digital health. Clusters such as East London's TechCity are successfully integrating the UK's historic strength in research with commercialisation skills. In 2014, London-based technology start-ups attracted \$1.4 billion in funding, double the 2013 figure, and investors such as Google ventures opened their European office in London. However, this investment is still low compared to other technology clusters such as Silicon Valley (£22 billion)<sup>125</sup> and currently, only 4% of UK technology companies are focusing on digital health.<sup>126</sup> There may be an opportunity for the UK to build on the success of TechCity to help encourage the growth and commercialisation of small digital health companies. Many interviewees agreed with this perspective:

*"London seems to be creating momentum as a start-up location, and both US and UK investors are generally positive about its future growth prospects"*

Nesta

*"It's an amazing place for talent attraction, although the cost of living/staff is higher in London, it's a good place for people to send their kids to school etc"*

CEO, mHealth company

However a key weakness in the UK ecosystem is the skills and capabilities of the start-up teams. on the management team, there is often a lack of people with the skills to develop and commercialise a good idea. In contrast, locations such as Silicon Valley have extensive professional networks for new firms to use in order to grow new businesses. As well as a management skills gap, there is also a significant technical skills gap in terms of health analytical capabilities in the UK. Investment and public-private collaboration is needed in order to develop the current focus and quantity of skills in the UK.

### 3) Scale up

Although the UK has a good reputation for generating ideas, it seems there is less capability around bringing the ideas successfully into clinical practice. A critical hurdle to navigate is the “valley of death”: the period of time in the growth cycle between initial spin-out/start-up with seed funding and successful exit, either through acquisition or IPO. Investors look for a fast return on their investment; in healthcare, clinical trials can stretch this time span beyond that acceptable period. As discussed above, digital health attracts significant investment, however, as well as the total funding pot being lower, UK investors are also more risk averse than US counterparts. This can limit the amount of money available for scale up, or add additional phasing which redirects management attention to securing funding for the next phase rather than focussing on scale up.

*“US funding is bigger and earlier. The UK has a drip feed funding approach in earlier phase which takes more management effort and makes it more likely that companies will to fail at early stages”*

Partner, Law firm

Adoption of digital health solutions is a challenge to scaling these companies in the UK.

- Local adoption and reimbursement: there is no centrally agreed reimbursement mechanism for many digital health offers, particularly health apps. This leaves local trusts and CCGs to negotiate and arrange local payment mechanisms. Navigating these local arrangements is lengthy and resource intensive, especially for small companies with limited resources.
- Cost-effectiveness – There is often a lack of data showing clear cost-effectiveness and patient outcomes of digital health interventions as access to patient data is difficult., limiting uptake by the system Although the NHS seems the obvious partner of choice for clinical studies in the UK, it can be difficult to get studies initiated and cultural issues can inhibit progress in a reasonable timescale.
- Budget silos: often digital health solutions represent a benefit to a different part of the system to where the costs are incurred. For example telecare services are paid for by local authorities as part of social care packages but the cost savings can occur in the acute setting. Integrated health and social care budgets will go some way towards reducing this hurdle, but short term cost containment will still be an issue.

*"The biggest problem is scaling up and the need to get round the CCGs and the government, which makes it hard for smaller companies to gain the scale. Easier for the large companies to win: they have the infrastructure that gives the social services comfort when awarding contracts"*

Director, Digital Health company

*"Getting the first few customers is really important to build a track record; you need big customers you can scale with and those are easier to find in the US"*

Venture capitalist

*"NHS is the obvious partner of choice but it's quite difficult to get studies done"*

Director, SME

Academic Health Science Networks (AHSNs) and NHS test beds announced earlier in 2015<sup>127</sup> should provide a format for experimentation for digital health solutions, allowing them to gather customer feedback and develop their offering in an agile way. This approach will enable companies to begin to gather the evidence required to show effectiveness and attract further investment for full scale trials should they be required. A number of interviewees noted that developing a cost-effectiveness evidence base in the UK was helpful for generating sales in export markets, due to the rigour applied in UK markets.

Another barrier to scale in the UK is the availability of resources, in particular skills in health analytics. To overcome this hurdle, small companies often partner with global corporates to access the required resources. For example PAERS (Patient Access to Electronic Record Systems Ltd), which provides automated arrival packages at GP surgeries has a number of commercial and academic partners, including EMIS Health, specialists in connected healthcare software, and Egton for the supply of IT infrastructure.<sup>128</sup>

#### 4) Exit

Start-up companies that have successfully grown and scaled often exit the growth cycle by being acquired. Floating on the stock market through an Initial Public Offering (IPO) is also an option but this has not been a common route in the UK.

In Health Analytics, where large companies are developing health analytics specialist teams, small companies are being acquired at pace. For example, earlier in 2015, Dr Foster was acquired by Australian company Telstra, following a partnership agreement in the country.<sup>129</sup>

Acquisitions are also occurring in the mature and consolidating telehealthcare market. For example, French company LeGrand acquired UK-based telecare provider Tynetec in 2013<sup>130</sup> and UK market leader Tunstall acquired Swedish digital health company STT Condigi in 2012.<sup>131</sup> Some of this activity is driven by non-health companies buying into the connected home concept and building a portfolio of complementary products and services.

There are few examples of exit through IPO for digital health companies in the UK, and none identified since 2013 when Servelec Group plc and Cambridge Cognition floated on the London Stock Exchange.<sup>132</sup> Servelec Group is an electronic medical records provider; Cambridge Cognition is a provider of computerized neuropsychological assessment products for research and clinical trials. Fitbug, which makes wearable fitness trackers, is listed on the Alternative Investment Market (AIM).

*"M&A is on the up ... A lot more of the outskirt companies are interested in getting involved based on the connected home idea"*

Director, Digital Health company

*"A lot of things going for the UK: more rigorous at an early stage, ask for more evaluation upfront, this then means it's easier to take it abroad"*

CEO, mHealth company

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# References

- 1 *Whole system demonstrator programme: Headline findings – December 2011*, UK Department of Health News website, 5th December 2011
- 2 “Cost effectiveness of telehealth for patients with long term conditions (Whole System Demonstrator telehealth questionnaire study: nested economic evaluation in a pragmatic, cluster randomised controlled trial” BMJ 2013
- 3 NHS England website <http://www.england.nhs.uk/ourwork/qual-clin-lead/tecs/>[accessed 8th September 2015]
- 4 *Primary care: Working differently: Telecare and telehealth – a game changer for health and social care*, Deloitte Centre for Health Solutions, 2012
- 5 *Remote Patient Monitoring Market in Europe in Europe witnessing a High Growth Trajectory*, Frost & Sullivan, 2010
- 6 *ICT & Ageing: European study on users, markets and technologies*, European Commission, 2010
- 7 *Primary care: Working differently: Telecare and telehealth- a game changer for health and social care*, Deloitte Centre for Health Solutions, 2012
- 8 *Remote Patient Monitoring Market in Europe in Europe witnessing a High Growth Trajectory*, Frost & Sullivan, 2010
- 9 “*The smartphone generation gap: over-55? there’s no app for that*” Deloitte, London 2014
- 10 *O2 to stop selling telecare & telehealth in the UK* July 23 2013 Telecare Aware website, <http://telecareaware.com/o2-to-stop-selling-telecare-telehealth-in-the-uk/>[accessed [accessed 8th September 2015]
- 11 Philips Hospital to home site <http://www.hospitaltohome.philips.com/programs> [accessed 8th September 2015]
- 12 Keepus website, <https://keepus.com/>[accessed 8th September 2015]
- 13 uMotif website <https://www.umotif.com/>[accessed 8th September 2015]
- 14 LeGrand news release, <http://www.legrand.co.uk/news/legrand-acquires-healthcare-and-assisted-living-specialist> [accessed 8th September 2015]
- 15 ITPRO website, ‘British Gas to pay £44m for AlertMe in Hive brand expansion’, 13 February 2015 by Caroline Preece available at <http://www.itpro.co.uk/strategy/24050/british-gas-to-pay-44m-for-alertme-in-hive-brand-expansion>
- 16 ITPRO website, ‘British Gas to pay £44m for AlertMe in Hive brand expansion’, 13 February 2015 by Caroline Preece available at <http://www.itpro.co.uk/strategy/24050/british-gas-to-pay-44m-for-alertme-in-hive-brand-expansion>
- 17 *Population Ageing: Statistics*, House of Commons Library, 2012
- 18 For those aged over 65 years, the number of emergency admissions has increased by 46% over the past decade.
- 19 Diabetes: Facts and Stats, Diabetes UK, May 2014
- 20 *Five Year Forward View*, NHS England, October 2014
- 21 *Care and support at home: An audit of telecare services in England*, A report from the Good Governance Institute, September 2012
- 22 Deloitte interviews

- 23 *All Party Parliamentary Group on Housing and Care for Older People. Living Well at Home Inquiry*, 2011. Demos, Top of the Ladder, September 2013
- 24 *The Whole System Demonstrator Programme*, final report August 2014
- 25 *Implementing Skype Consultations in General Practice*, NHS Central London CCG, 2014
- 26 *Keeping the NHS Great, Delivering technology enabled care services: A Good Governance Institute discussion paper*, Good Governance Institute, September 2014
- 27 *Tackling Telehealth: How CCGs can commission successful telehealth services*, Inside commissioning and Simple Telehealth, March 2014
- 28 *An Overview of Health IT @ Kaiser Permanent*, NIST Health IT Symposium Series, April 2013
- 29 Greater Manchester Combined Authority website, 2015 <http://gmhealthandsocialcaredevo.org.uk/>[accessed 8th September 2015]
- 30 Deloitte interviews
- 31 *mHealth New horizons for health through mobile technologies*, Global Observatory for eHealth series – Volume 3, WHO, 2011
- 32 *mHealth app developer Economics 2014: The state of art of mHealth app publishing*, research2guidance, May 2014
- 33 *Mobile Device Apps –UK*, October 2014, Mintel Group Limited
- 34 *Mobile health: who pays?* GSMA and AT Kearney, 2012
- 35 *Mobile Health Technologies and Global Markets*, BCC Research, 2014
- 36 *Connected Health*, Deloitte Centre for Health Solutions, 2015
- 37 *mHealth Report*, Ruder Finn 2013
- 38 *Wearable electronics and technology market by applications: analysis & forecast to 2014-2020*, MarketsandMarkets, September 2014
- 39 *Wearable technology market insights*, Technavio, 2013
- 40 *Global wearable device market: key research findings 2014*, Yano research institute ltd, 2014
- 41 *Wearable technology: KARIM foresight report*, Karim, 2014
- 42 Deloitte interviews
- 43 *mHealth app developer Economics 2014: The state of art of mHealth app publishing*, research2guidance, May 2014
- 44 *mHealth app developer Economics 2014: The state of art of mHealth app publishing*, research2guidance, May 2014
- 45 *mHealth: New horizons for health through mobile*, WHO, 2011
- 46 Fox. S and Duggan. M, *Mobile Health 2012, Pew Research Center's Internet & American Life Project*: Washington D.C, 2012

- 47 *Share of mobile phone users that use a smartphone in the United Kingdom from 2010 to 2017* Statista <http://www.statista.com/statistics/257051/smartphone-user-penetration-in-the-uk/> [accessed 8th September 2015]
- 48 *Internet Access – Households and Individuals 2014*, Office for National Statistics, Statistical Bulletin, August 2014
- 49 *Consumer adoption of mHealth*, Deloitte Center for Health Solutions, 2013
- 50 *The UK: your partner for digital health*, Department of Health and UKTI, 2015
- 51 *The potential for digital health*, 2014, Tech UK
- 52 *Emerging mHealth: Paths for Growth*, PWC 2013
- 53 *One in five Americans to purchase a wearable device*, Eurocis, December 2014
- 54 *Inside Wearables – Part 2*, Endeavour Partners, July 2014
- 55 Deloitte interviews
- 56 *Mobile Medical Applications: Guidance for Industry and Food and Drug Administration Staff*, FDA, February 2015
- 57 *FDA Watch: mobile medical apps* from Hunton news [https://www.hunton.com/files/Publication/40560c6b-258d-4a54-b41e-b11b7ee69e3d/Presentation/PublicationAttachment/ff1a658b-7e8f-4adc-bb86-c29f0d6f5f61/Contract\\_Pharma\\_Nov-Dec2013.pdf](https://www.hunton.com/files/Publication/40560c6b-258d-4a54-b41e-b11b7ee69e3d/Presentation/PublicationAttachment/ff1a658b-7e8f-4adc-bb86-c29f0d6f5f61/Contract_Pharma_Nov-Dec2013.pdf) [accessed 8th September 2015]
- 58 *Marketing Mobile Health*, Digita Health, mBook 2013 Edition
- 59 NHS Choices Health Apps Library <http://apps.nhs.uk/review-process/> [accessed 8th September 2015]
- 60 *Information: To share or not to share?* The Information Governance Review, UK Department of Health, March 2013
- 61 *Emerging mHealth: Paths for Growth*, PWC 2013
- 62 *A Leading Digital Nation by 2020: Calculating the cost of delivering online skills for all – What is the investment needed to get everyone in the UK using the internet regularly with Basic Online Skills?* Tinder Foundation and Go ON UK, February 2014
- 63 *Tinder Foundation wins NHS Contract*, Tinder Foundation website, September 2013, <http://www.tinderfoundation.org/our-thinking/news/tinder-foundation-wins-nhs-contract> [accessed 8th September 2015]
- 64 *mHealth Challenges and Opportunities in Emerging Markets*, Accenture, 2014
- 65 *UK App Economy 2014: Sizing the app economy, jobs and opportunities for developers in Britain*, VisionMobile, 2014
- 66 *UK App Economy 2014: Sizing the app economy, jobs and opportunities for developers in Britain*, VisionMobile, 2014
- 67 *Mobile Health Technologies and Global Markets*, BCC Research, 2014
- 68 *Connected Health*, Deloitte Centre for Health Solutions, 2015
- 69 *Mobile health: who pays?* GSMA and AT Kearney, 2012
- 70 *Consumer adoption of mHealth*, Deloitte Center for Health Solutions, 2013

- 71 Flurry analytics website, July 18 2013, <http://flurrymobile.tumblr.com/post/115189750715/the-history-of-app-pricing-and-why-most-apps-are> [accessed 8th September 2015]
- 72 Fitbug annual report, 2014
- 73 TechWorld News, October 2014 <http://www.techworld.com/news/wearables/european-wearable-tech-startups-get-boost-as-first-dedicated-accelerator-lands-in-london-3580358/>[accessed 8th September 2015]
- 74 *Health and fitness wearable tech market set to double to 13.1m users in 2015*, Kantar Media website, October 2014
- 75 *Health and fitness wearable tech market set to double to 13.1m users in 2015*, Kantar Media Future Proof Report, October 2014
- 76 *Wearable technology market insights*, Technavio, 2013
- 77 *Global wearable device market: key research findings 2014*, Yano research institute ltd, 2014
- 78 *Wearable technology- KARIM foresight report*, Karim, 2014
- 79 *Health and fitness wearable tech market set to double to 13.1m users in 2015*, Kantar Media Future Proof Report, October 2014
- 80 Mckinsey Global Institute
- 81 *Big Data Road Map*, ABPI, 2013
- 82 *Healthcare analytics/medical analytics market*, Markets and Markets, 2015
- 83 *Global healthcare analytics*, Research Fox, 2014
- 84 *Healthcare analytics market*, Transparency research, 2015
- 85 Deloitte interviews
- 86 *How big is 'big data' in Healthcare?*, SAS Institute 2011
- 87 Charles, D., Gabriel, M., Searcy T., *Adoption of Electronic Health Record Systems among U.S. Non-Federal Acute Care Hospitals: 2008-2014*. ONC Data Brief, no.23. Office of the National Coordinator for Health Information Technology: Washington DC, April 2015
- 88 *Digitising the NHS by 2018 – One Year On*, TechUK, March 2014
- 89 *Big Data Road Map*, ABPI, 2013
- 90 *Data helps drive lower mortality rate at Kaiser*, CIO Journal blog, December 2013 <http://blogs.wsj.com/cio/2013/12/05/data-helps-drive-lower-mortality-rate-at-kaiser/>[accessed 8th September 2015]
- 91 *World Preview 2013*, Outlook to 2018: Returning to Growth, EvaluatePharma, 2013
- 92 *Cost of Developing a New Drug*, Tufts Center for the Study of Drug Development, November 2014
- 93 Eheberg, D., Batscheider, A., Lebioda, Plantor, S. And Fricke, F.U. PHP199 The impact of the German Pharmaceutical Market Reorganisation Act (AMNOG) on the German Reference Price Market – Trends Two Years After the Introduction of the AMNOG, *Value in Health* (15):8 pA324, November 2012
- 94 *Analytics and the path from insights to value*, MIT Sloan/IBM Big Data, 2011

- 95 *Taking organ transplantation to 2020: a detailed strategy*, NHS Blood and Transplant, 2013
- 96 *Best practices report: Big data analytics*, TDWI, 2011
- 97 *Big Data Analytics: Adoption and employment trends*, SAS Institute, 2012
- 98 *Complex "big data" will be analysed to measure the efficiency and effectiveness of staffing levels in nursing at one NHS Trust*, London South Bank University news, <https://www.lsbu.ac.uk/about-us/news/lgbu-leads-project-to-examine-big-data-around-nursing> [Accessed 8th September 2015]
- 99 *Healthcare analytics/medical analytics market*, Markets and Markets, 2015
- 100 *Global healthcare analytics*, Research Fox, 2014
- 101 Cornford, T., Hibberd, R., and N Barber, N. *The evaluation of the electronic prescribing service in primary care*. Birmingham University, January 2014
- 102 Jha, AK., DesRoches, C., Campbell, E., Donelan, K., Rao, S., Ferris, T., Shields, A., Rosenbaum, S., and Blumenthal, D. *Use of Electronic Health Records in U.S. Hospitals.* N Engl J Med, 360, pp.1628-38, 2009
- 103 *Federal Health Information Technology Strategic Plan 2011 – 2015*, Office of the National Coordinator for Health Information Technology, 2011
- 104 *Overview of international EMR/EHR markets*, Accenture, 2010
- 105 *Electronic Health Records (EHR) market: Global industry analysis, size, share, growth, trends and forecast 2014-2020*, Transparency market research, 2014
- 106 *EMR 2015: the market for electronic medical records*, Kalorama information, 2015
- 107 Cerner annual report 2014
- 108 Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., Morton, S., and Shekelle, P. *Systematic Review: impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care*, Ann Intern Med, 144, pp.742-752, 2006
- 109 Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., Morton, S., and Shekelle, P. *Systematic Review: impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care*, Ann Intern Med, 144, pp.742-752, 2006
- 110 Deloitte interviews
- 111 *Vast majority of GPs use electronic medical records*, Computer Weekly, November 2012
- 112 *Guide to the new GP Systems of Choice Framework Agreements*, HSCIC, 2014
- 113 EMIS 2014 annual report
- 114 *Overview of international EMR/EHR markets*, Accenture, 2010
- 115 *Electronic Health Records (HER) market: Global industry analysis, size, share, growth, trends and forecast 2014-2020*, Transparency market research, 2014
- 116 *Market study of electronic medical record systems in Europe*, Logica, 2012
- 117 *EMR 2015: the market for electronic medical records*, Kalorama information, 2015
- 118 *Digitising the NHS by 2018 – One year on*, Tech UK, March 2014

- 119 *TechNation: powering the digital economy*, 2015, UK TechyCity 2015
- 120 SCImago Journal & Country Rank, <http://www.scimagojr.com/countryrank.php> [accessed 8th September 2015]
- 121 UK's Digital Economy research boosted by £23 million investment in six new world-leading centres, EPSRC news, <https://www.epsrc.ac.uk/newsevents/news/ukdecentres/>[Accessed 8th September 2015]
- 122 *Digital Health Institute Case Study: Innovation Centre to boost digital health technologies*, Glasgow Caledonian University press release,
- 123 *Q1 2015 healthcare IT funding and M&A report*, Mercom Capital Group, May 2015
- 124 Index Ventures newsroom, April 2014 <https://indexventures.com/news-room/news/digital-health-start-up-big-health-raises-33-million-series-a-round> [Accessed 8th September 2015]
- 125 *Venture Capital funding of London tech start-ups doubles*, Financial Times, December 2014
- 126 *TechNation: powering the digital economy*, 2015, UK TechyCity 2015
- 127 NHS Engalnd webite <https://www.england.nhs.uk/ourwork/innovation/test-beds/>[accessed 8th September 2015]
- 128 PAERS company website <http://www.paers.net/paers-partners.shtml> [accessed 8th September 2015]
- 129 *Dr Foster acquired by Telstra Health*, Dr Foster news website <http://www.drfooster.com/updates/news/dr-foster-acquired-by-telstra-health/>[Accessed 8th September 2015]
- 130 *Legrand acquires healthcare and assisted living specialist*, Legrand news website, <http://www.legrand.co.uk/news/legrand-acquires-healthcare-and-assisted-living-specialist> [Accessed 8th September 2015]
- 131 *Tunstall Healthcare finalises the acquisition of STT Condigi*, Tunstall news website, <http://www.tunstall.co.uk/news/211/tunstall-healthcare-finalises-the-acquisition-of-stt-condigi> [Accessed 8th September 2015]
- 132 *New Issues and IO summary database*, London Stock Exchange, [downloaded July 2015]

# Notes

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