Deloitte.

Healthcare in 2065
Personalised healthcare designed around you

Sensors, smart devices, wearables and sophisticated technologies will begin to replace the traditional health checkup, tracking everything from vital signs, caloric intake/ consumption to sleep patterns. The convergence in technologies will form the basis of the medicalised quantified self; healthcare of the future is truly designed around the individual.

Introduction

Waking up in 2065 means being roused out of bed by the holographic avatar of your smart home's Artificial Intelligence (AI). The interconnected devices that comprise it automatically turn on the shower and hail a driverless cab to your front door. Before you get into the taxi, the smart home monitors the refrigerator and creates a list of groceries to buy. It also notes the potential build-up of dust and microbes in your room, sending alerts to the lens display of your glasses. A fingerprint scan on your smart watch acknowledges both events, simultaneously authorising the purchase of groceries and initiating your apartment to clean itself immediately. As you sit in the driverless cab, its collective intelligence calculates the best possible route by taking into account all the other vehicles in the area, eliminating traffic congestion altogether.

In 2065, the future is designed around you.

Care Designed for One

Healthcare will be no different. Shoes will adapt their insoles for the perfect arch support to correct an individual's gait as he or she goes. Cappuccino will be served in a smart cup that calculates the calories of its contents while ordinary looking earrings track heart rate, noise levels and air quality. Ubiquitous sensors will monitor the environment while wearables analyse bodily function in real-time. In concert they form a backbone of medical data that allows for therapeutic strategies to be built around the individual. The information collected will be sent to tele-medical centres dotted across the globe. Concurrently, individualised genetic profiles will more accurately predict disease risk and provide a template to manufacture customised pharmaceuticals. Such advances will also be the basis for improvements in stem cell manipulation and serve as the preeminent solution to currently untreatable conditions. On the back of these scientific revolutions, the provision of healthcare in 2065 will be unrecognisable compared to today.

Patient-consumers now take full ownership of their own health data and are fully empowered to choose the manner of care best suited to them. By merely feeding this information to a selected healthcare provider, the patient is presented with a bespoke healthcare plan. A plan is then synced to all personal smart devices to guide the patient through daily routines and to improve their overall health. From modifying the exercise regimen to delivering custom medicines and supplements, medical provision of the future is holistic and seamless. Beyond personalised medicine, the technologies that will lay the foundations of future healthcare are already here today.

18th Century
Agriculture age

19th Century
Industrial age

TECHNOLOGY

- 1876 Telephone
- 1879 Light bulb
- 1886 Modern car
- 1914 First commercial flight
- 1926 Television
- 1945 Computer
- 1973 Mobile phone
- 1989 World Wid Web

SINGAPORE

- 1975 Medicine Act
- 1980 Private Hospitals & Medical Clinics Act
- 1983 National Health Plan
- 1984 Medisave
- 1990 Medishield
- 1993 Medifund
- 1997 Medical Registration Act
- 2001 Health Promotion Board
- El

SCIENCE AND MEDICINE

- 1895 X-ray
- 1929 Penicillin
- 1948 World Health Organization oversees international health regulation
- 1953 DNA structure resolved
- 1972 CT
- 1980 Smallpox eradicated by immunisation (SMALL POX)

BUSINESS

Big corporations

Technology sta

The Great Depression 1928 - 1939

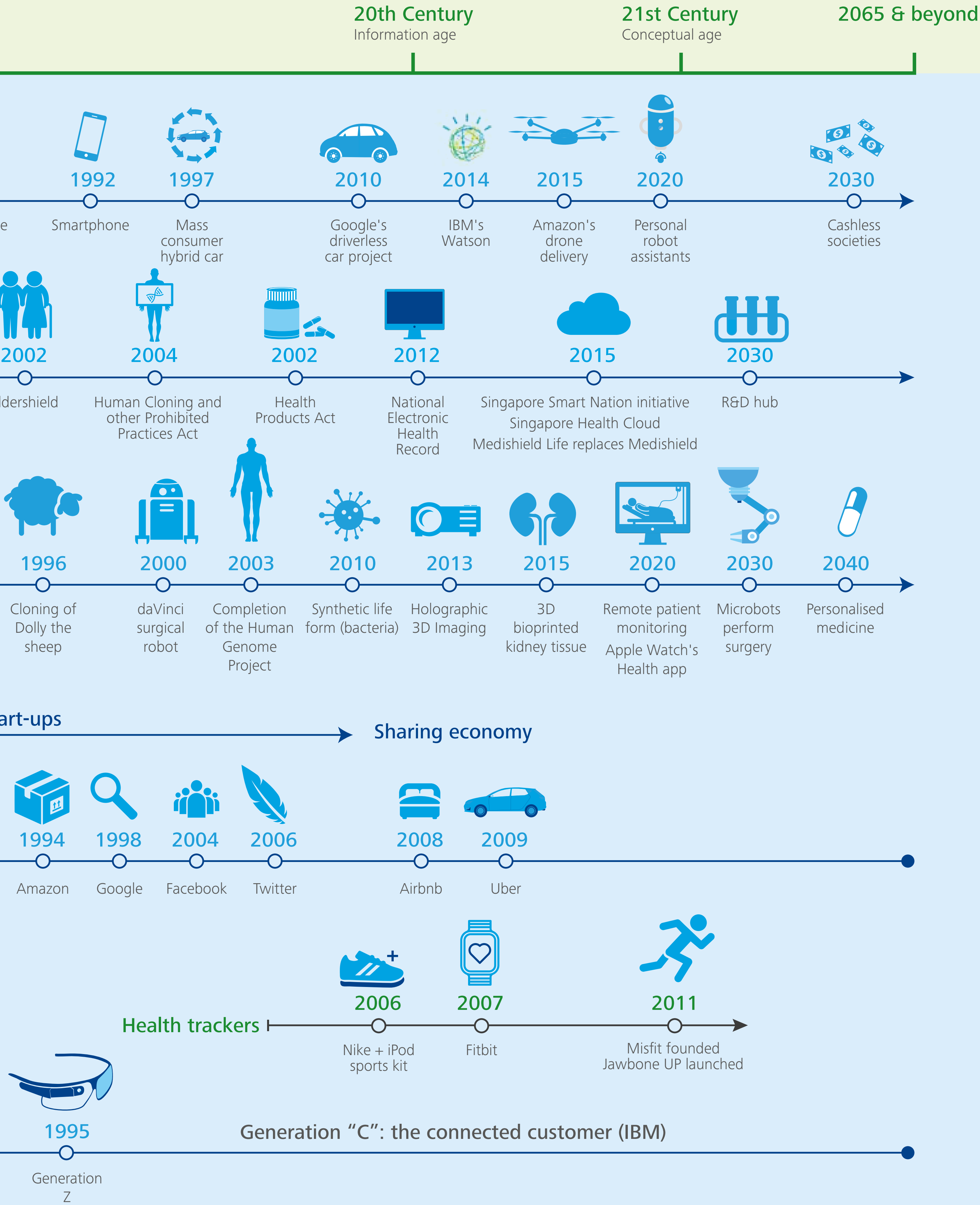
- 1892 The Coca-Cola Company
- 1923 Walt Disney Company
- 1955 McDonald's
- 1964 Nike, Inc
- 1975 Microsoft
- 1976 Apple

CONSUMER PROFILES (NIELSEN)

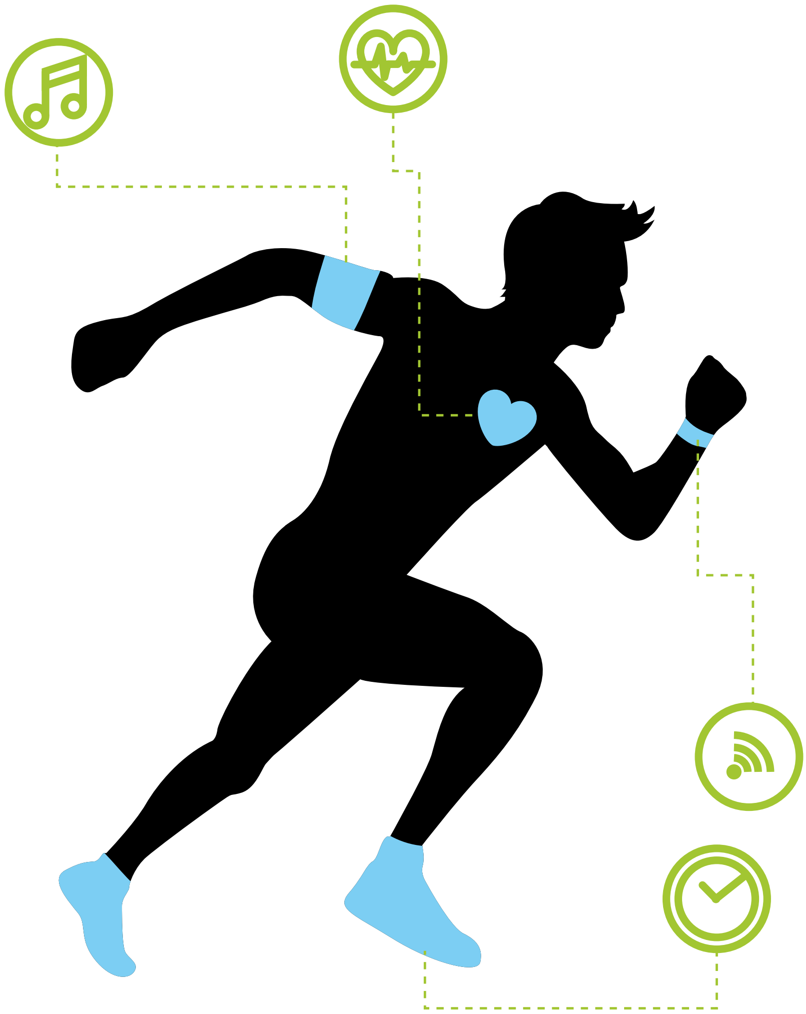
(Generation's signature product)

- 1901 Greatest generation
- 1925 Silent generation
- 1946 Baby boomers
- 1965 Generation X
- 1977 Millenials/ Generation Y

**References made beyond 2015 are based on sensing and prediction.


20th Century
Information age
21st Century
Conceptual age
2065 & beyond
1992
Smartphone
1997
Mass consumer hybrid car
2010
Google's driverless car project
2014
IBM's Watson
2015
Amazon's drone delivery
2020
Personal robot assistants
2030
Cashless societies
2002
dershield
2004
Human Cloning and other Prohibited Practices Act
2002
Health Products Act
2012
National Electronic Health Record
2015
Singapore Smart Nation initiative
Singapore Health Cloud
Medishield Life replaces Medishield
2030
R&D hub
1996
Cloning of Dolly the sheep
2000
daVinci surgical robot
2003
Completion of the Human Genome Project
2010
Synthetic life form (bacteria)
2013
Holographic 3D Imaging
2015
3D bioprinted kidney tissue
2020
Remote patient monitoring
Apple Watch's Health app
2030
Microbots perform surgery
2040
Personalised medicine
art-ups
Sharing economy
1994
Amazon
1998
Google
2004
Facebook
2006
Twitter
2008
Airbnb
2009
Uber
Health trackers
2006
Nike + iPod sports kit
2007
Fitbit
2011
Misfit founded
Jawbone UP launched
1995
Generation Z
Generation "C": the connected customer (IBM)

Towards Perfect Information



Fitness trackers that focus on improving user wellness, such as those manufactured by Fitbit and Jawbone, are becoming increasingly popular. Such wearables will allow for accurate monitoring of an individual's heart rate, sleep patterns, exercise regimes and even stress levels in the near future. Combined with mobile health apps that record food intake, these give consumers a snapshot of their lifestyle and habits. The data is then analysed and used to provide recommendations to users as to how they can improve their health by setting fitness goals in their day to day activities. The ability to share and compare their health journeys on social media encourages competition across the platform.

Furthermore, certain wearables deliver haptic feedback when goals are reached. Such notifications, together with the awarding of achievement badges, bring gamification concepts to fitness and serve as further motivation for users to constantly improve on their exercise and diet performance.

Such a holistic fitness ecosystem has been shown to translate to better overall wellness outcomes for the consumer. As a result, some corporations are actively providing their employees with fitness trackers in an effort to maintain workplace health. They serve as a way to maintain employee wellness, while also functioning as a social platform for colleagues to engage in healthy, competitive exercise. Overall, the mantra is that a healthier workforce is a happier and more productive one[1]. Furthermore, health insurance companies are also keen on fitness trackers for their clients. Vitality, for example, a wellness programme based on behavioural, actuarial and clinical principles and backed by insurance providers in the UK and the US, promotes the use of fitness trackers by their members; usage of a Fitbit tracker will earn the wearer a discount on their insurance premium[2]. This is understandable as the data provided by the wearables is a far more accurate reflection of the user's health than traditional generalisations of age and sex. Thus, premiums can be tweaked according to the user with further discounts following the adoption of healthier activities. These nascent adoptions of wellness technology are still embryonic but nevertheless point definitively towards an overall acceptance and greater usage of wearable health technology in the future.

The genesis and subsequent rise of these technologies is the result of the consumer's desire to have more control. Users are increasingly keen to monitor all aspects of their daily life and modify their habits to fine tune their health outcomes. This push is likely to increase the functionality and scope of such wearables and other health peripherals. From simple pedometers to compact devices measuring air quality, these devices seek to confer greater mastery of the user's internal and external environments. These devices will be interconnected by design and work within the Internet of Things (IoT), forming a nexus of peripherals that stream a condensed packet of health related information directly to the user.

This data stream can now function as an accurate long-term journal of an individual's health history and environment. Buoyed by research on blood-glucose measuring smart-watches[3] and trials for mobile phone add-ons that can test biological samples for viruses, the home laboratory is coming to fruition[4]. Now, the burgeoning pool of wellness data collected has the ability to exist in a diagnostic capacity as well – a function that is especially pertinent for the elderly or chronically ill. For such vulnerable individuals, an interconnected data stream of their health habits, coupled with analytics on a mobile platform, serves to assist them in managing their ailments. For example, diabetes sufferers may now more accurately dose their insulin because they have real time information on their blood-glucose levels. In fact, should the corresponding infrastructure be created, it is very plausible that such data could be transmitted to a doctor during a regular consultation. This provides the clinician with a far more accurate way of establishing the patient's condition and serves as the ultimate tool of evidence based medicine.

This technology is likely to shift the perspective of how health is viewed by the citizens of the future. Moving away from once-off visits to the doctor, health monitoring is a continuous endeavour with specific targets based around the user's interactions with their environment. As a result, other products that help exert a greater degree of user health control and customisation will also see a rise in interest. To this end, a greater take-up of medical peripherals and the corresponding data generated allows for a clear snapshot of an individual's health to be presented in a digitised format. The veracity and mobility of such information can only serve to improve the way a patient's condition is appraised by a doctor.

1 http://www.theguardian.com/technology/2015/jun/19/is-corporate-wellness-the-big-new-thing-that-will-keep-fitbit-ahead-of-the-pack
2 http://money.cnn.com/2015/04/08/technology/security/insurance-data-tracking/
3 http://www.ibtimes.co.uk/exclusive-microsoft-smartwatch-will-feature-uv-sensor-blood-glucose-monitor-1456756
4 http://www.wired.com/2014/08/biomeme/

The Virtual-Physical Model

The bulk of patient volume in any country is catered to by primary healthcare. But across the developed world, patient congestion in this area has become a problem. Primary health repeatedly caters to a large group of patients that largely utilise outpatient medical treatment, health screenings as well as diagnostic and pharmaceutical services. With an increasingly elderly population, coupled with a rise in the incidence of chronic diseases, the strain and emphasis on primary healthcare is greater than ever. In this regard, the technological advances in the mobile health ecosystem provide solutions to enable changes in the clinical practice model.

As previously stated, the utilisation of wearables and mobile wellness apps confers greater self-ownership of one's health. It enables the consumer to monitor, analyse and make adjustments to their lifestyles to maintain their well-being. In this regard, the "health space", previously consigned to the doctor's office and hospitals, has now become centred predominantly on patients and their homes. Healthcare is now the daily affair of managing the displayed stream of health data on their mobile devices with an effort akin to scrolling through social media feeds. This decidedly rings in the nascent decentralisation of healthcare into a patient-centric mobile format.

Under the spectre of an "always on" health infrastructure, the elderly or chronically ill can constantly monitor their conditions. In this scenario, data measured by wearables or health peripherals can ostensibly be transmitted to the doctor's office or health centre wirelessly and in real time. This affords healthcare practitioners of the future the ability to rely on a near perfect digital patient history. The constant stream of data opens up lots of possibilities. Firstly, it means that patients would only be asked to see a doctor for further screening if anything abnormal is detected. From a patient's perspective, this prevents unnecessary and arduous trips to the clinic. Perhaps more pertinently, the detection of any such abnormality by home diagnostic peripherals occurs at the pre-symptomatic stage.
This streamlines the focus of primary healthcare to a more preventive model that not only saves time for the patient but also saves costs for governments and healthcare providers. This standardised set of health informatics gathered by wearables can be established as a benchmark against which patients of the future are examined. In so doing the ability to transmit such data to a health centre or doctor's office creates a clearer picture of the patient's health with a lower likelihood of misinterpretation. Such a pioneering programme could ostensibly be expanded to include all primary healthcare

patients. Basic conditions (e.g. cough, cold or fever) could be diagnosed by advanced software packages and home screening technology designed to read this constant stream of health data. Furthermore, if more complex situations arise, it would be possible for patients to expand on current telemedicine technology and have a consultation with their doctor while providing the necessary data from their own home. Given the benefits of such a structure, it is not unforeseeable that this would serve to disrupt the provision of primary healthcare as it is currently known.

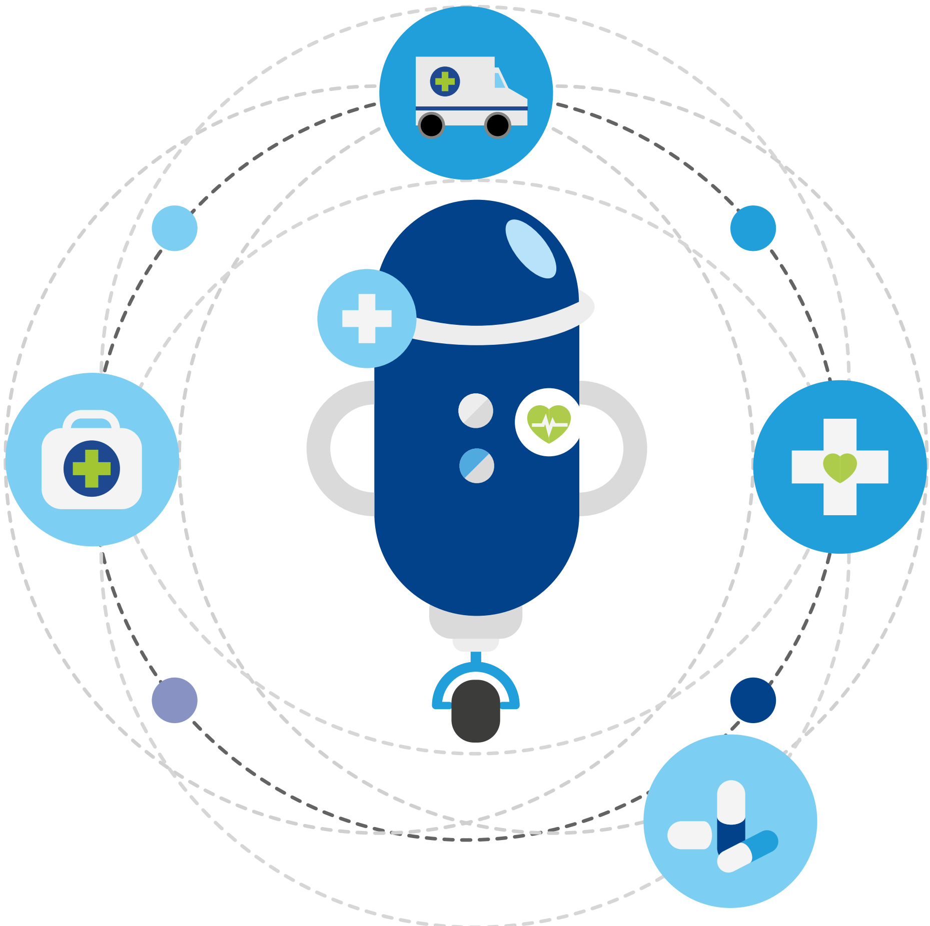
In shifting the health space to the home, the ability for the consumer to access medicines must also keep up. In effect, consumer patients will demand for a pharmacy right at their door step. Building on current Brick-2-Click models may suffice in the near term, but the demand for instantaneous care is likely to deem such logistics insufficient. As a solution, pharmacological dispatches can be built on the delivery infrastructure of the future: drones. A proof of concept test has already been done with a drone carrying medication to a small town in America. The Flirtey Inc. machine carried a total of 10 pounds of medical goods to the small clinic in Virginia which is 90 minutes away from the nearest dispensary[5]. Where patients would usually have to wait days for their medication, it was now available in a matter of hours. Similarly, the urban centres of the future would likely benefit from drone delivery as offsite pharmacies located away from high-cost commercial districts can still cater to patients. E-prescriptions come in from telemedicine centres and pharmacies dispatch orders with their fleet of drones. Patients can then receive these boxes of medication in their own home and access them securely via biometrics.

In an attempt to better understand the human body, science first sought to visualise its inner workings. From rudimentary X-rays to MRIs, these technological developments have all sought to continue along that line of reasoning. Current diagnostic imaging technologies may be limited to 2D images but modern advances in projection technology are liberating medical images from the constraints of a screen. Holographic images are now able to precisely map out a patient's heart by combining various scans and displaying it as a floating 3D image. This technology goes beyond the surface by also mapping out the intricate channels and vessels of the heart's interior[6]. Not only is this an improvement to 2D images, it also allows surgeons to practise on the model before the real operation. The 3D hologram can be displayed and even manipulated by digital tools mimicking incisions. In fact, this can even be done in real time, while the surgery is being carried out. With minimally invasive surgery in mind, this allows surgeons to have a complete and unobstructed 3D view of the heart while working through a keyhole incision. Over time, such technology will expand into other types of surgery and lead to developments in how the holographs work. For example, analytics of patient blood flow can be incorporated with the 3D model to demonstrate to surgeons the outcomes of specific incisions on certain areas. In this way, surgeons will be better versed with the specific anatomy of each of their patients and can strategise more complex surgeries from the safety of their projection room.

Another innovation in the surgical sphere is augmented reality. Popularised by Google Glass, augmented reality allows users to view images and data over their field of view. In the case of surgery, this allows surgeons to super impose real time scans of their patients over the area they are working on[7]. This removes the guesswork of where major blood vessels might be and also informs the surgeon of the next steps in the surgery. Moreover, the usage of real-time streaming via Google Glass allows surgeons to be in contact with specialists located far away. Using the Glass camera, the surgeon calls a remotely located colleague to view the procedure in real time and advise at complex junctures. This technology also serves as a potential medical education tool. In concert with 3D imaging, augmented reality can help train doctors of the future by fine-tuning their surgical and anatomical knowledge in a safe environment. Not only does this allow for better learning, it also removes the cost and risk components of obtaining cadavers or operating on live patients.

5 http://www.wsj.com/articles/drone-delivers-medicine-to-rural-virginia-clinic-1437155114
6 http://www.cbsnews.com/news/3d-holograms-help-israeli-heart-surgeons/
7 http://venturebeat.com/2014/03/13/this-stanford-surgeon-shows-us-the-future-of-medicine-augmented-reali ty-google-glass-exclusive/

Robotics and A.I.



The global shortage of medical workers and allied health professionals have driven up the costs of healthcare provision. Coupled with the increasing number of elderly in developed countries, healthcare providers are increasingly strained to provide affordable care to all who need it. As hospitals try to reduce costs, they occasionally turn to robots as a solution. The Tug is a fully autonomous robot that is able to navigate hallways and utilise elevators all on its own. It is tasked with the daily delivery of food and medication to hospital patients and even goes as far as to manage laundry and medical waste in the wards[8]. This frees up nurses and allied health professionals to focus on more specific patient related tasks. In Japan, the aging population crisis is especially acute, leading to significant carer fatigue. Nurses and caregivers sometimes have to lift patients up to 40 times a day, increasing their risk of injury. Faced with such a pressing problem, many robotics firms are implementing humanoid home-helpers for the elderly. For example, the Robear is designed to assist ambulatory hampered patients by lifting them out of beds and into wheelchairs. Although they are only in the prototype phase, such developments have succeeded in proof of concept tests and seem to be gaining traction as a long term solution for patient care[9].

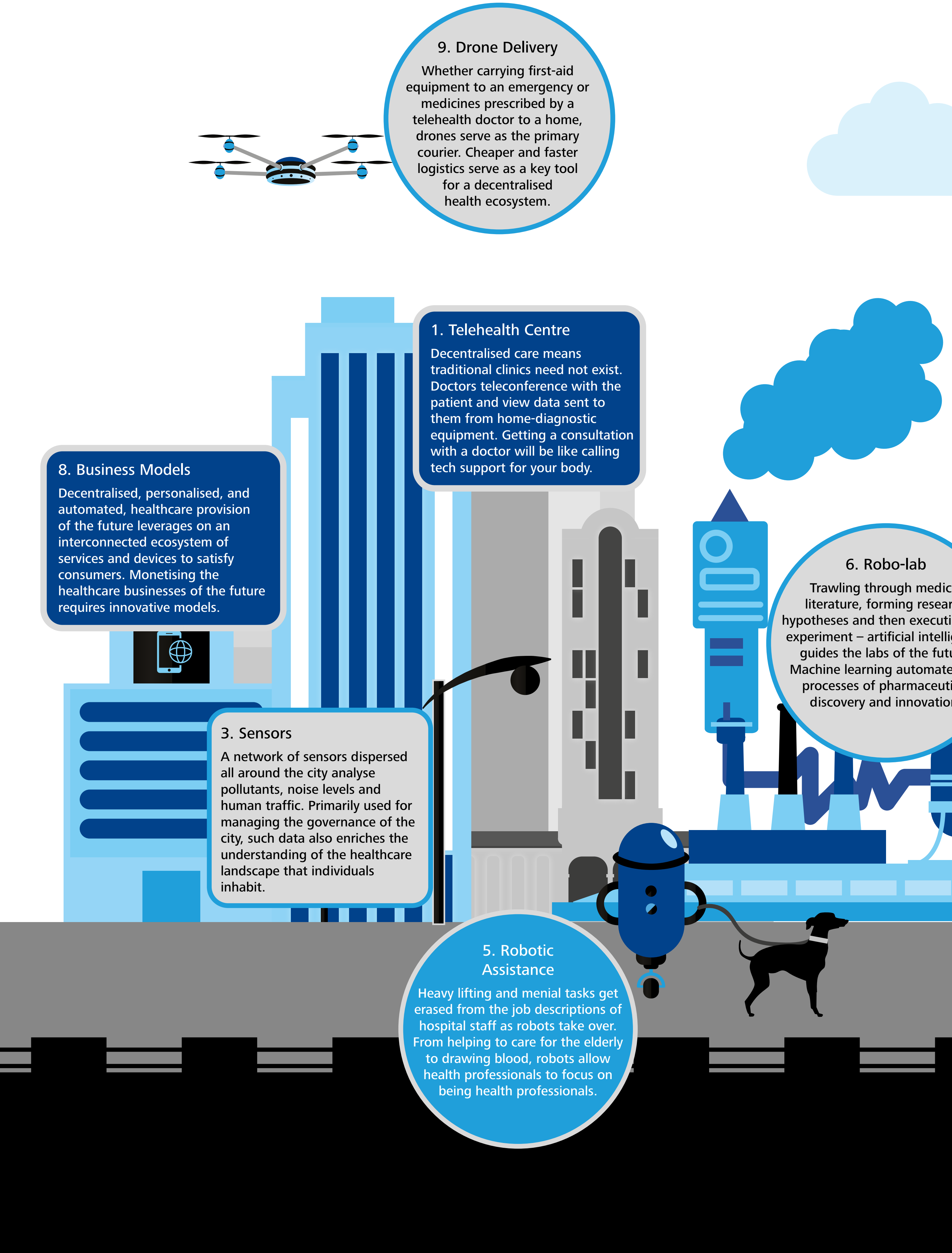
Robotics is also helping patients to move around in more direct ways. Often as a result of war, many individuals lose their limbs and are relegated to a life of strained mobility with cumbersome prosthetics. New advances in robotics and computational power however have left amputees virtually unhindered. Microprocessors and mobile lithium batteries in the prosthesis' ankle power the BiOM, supplementing power to the user's gait with every up-step. Building a carbon fibre spring into the limb allows for the prosthetic to mimic the natural biomechanics of the muscles in a human leg. Where a top of the line carbon-fibre limb would return 90% of the body's downward energy, the BiOM returns 200%. Best of all it weighs the same as a human ankle and foot[10]. Although traditional motivations for developing this technology were based around caring for veterans of warfare, the number one cause of lower limb amputation in the USA is diabetes. Among the elderly or those with poor disease management, gangrenous limbs occasionally result in amputation. As a result, high end robotic limb replacements have the possibility to enrich the lives of a broad spectrum of patients. Furthering the development of this technology is the potential to create a nerve-prosthetic interface that allows the user to move limbs with their thoughts. The Rehabilitation Institute of Chicago (RIC) has been researching something known as "targeted muscle reinnervation" which takes nerves from amputated limbs and embeds them in healthy muscles[11]. This allows the mechanics of the prosthetic to interact with the user's nervous system, enabling control of the prosthetic leg with instructions from the brain that are communicated down through nerves.

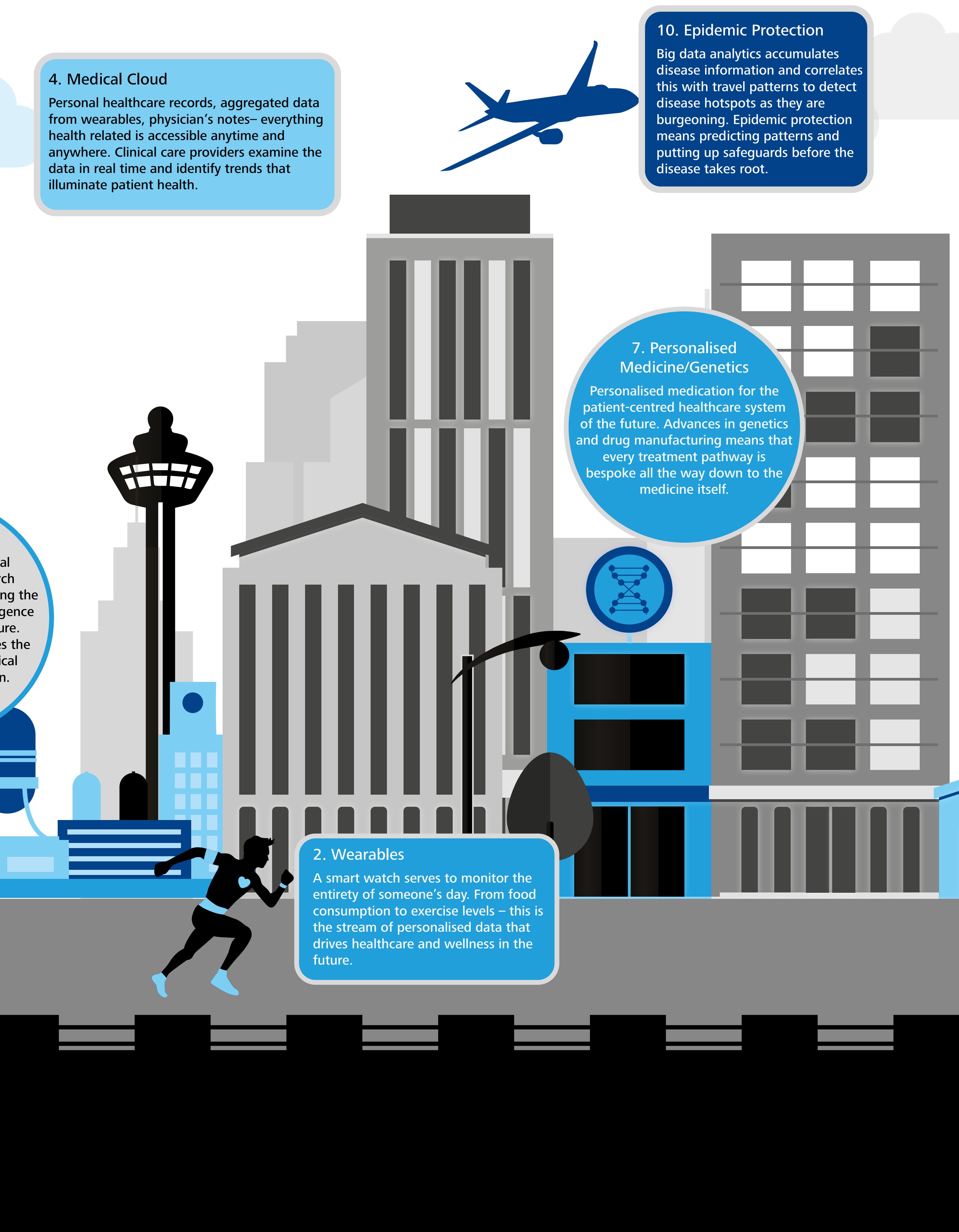
On the pharmaceutical front, robotics and artificial intelligence have the potential to increase the efficiency of the research process. More than just the ability to mechanise dull repetitive tasks, machine learning has allowed for research-bots to take the initiative. Robots form hypotheses based on previously compiled data, execute the experiment themselves and then analyse the results determining if the compounds tested could be a possible drug. This process is repeated over and over again creating a brute force approach that has long since been implemented as tool for research[12]. The nascent improvements of such technology however go so far as to weed out unlikely compounds for testing even before the experiments begin. This is known as high-content screening and works by mining data stores in an effort to make more targeted decisions on which experiments to carry out. Algorithms detail a list of potential chemicals that will be screened and each of these are experimented on. Any molecules found to be active are used to enhance the data pool and the process repeats itself until a list of viable molecules is formed. In addition, the data gleaned from these repeated experiments are fed back into the original algorithm, fine tuning its ability to discover new potential drugs .

From the micro focus on drug interactions to the macro perspective of disease spread, data analytics and artificial intelligence serve to improve healthcare. Using big data to map out problems and view patterns more accurately is not a new phenomenon. The Ebola outbreak in West Africa was stymied by big data analytics applied to cell phone usage. Anonymised data was pooled and trends in the Ebola hotline usage was used to map outbreak patterns and allow WHO officials to better allocate their strained resources[13]. This is in sharp contrast to traditional epidemiological mapping which would take a longer time and rely on the subjective anecdotal reports from everyday citizens, police and hospital staff. However, either method still relies on historical data, making intervention reactive rather than proactive. Moving forward, predictive data modelling is likely to thwart epidemics from ever gaining critical mass. Experimental analysis augmenting cell phone usage with social media data has proven to be predictive of the beginnings of flu season months before it even occurs. The widespread data collection characteristic of the future would likely augment such methods further. Data streams from all over the world can feed into a central epidemic screening protocol predicting and isolating diseases quickly and effectively.

Grander ambitions of artificial intelligence proponents seek to replace doctors entirely. Although this is unlikely, A.I. programmes married with access to massive stores of scientific data can serve as hyper intelligent doctor aides. IBM's Watson has already won fame by beating the world's Jeopardy champion but it has now been repurposed to more tangible aims. Able to virtually store all available medical literature, it has the potential to be a highly accurate and consistent diagnostician. But perhaps its most attractive quality is that it has the capability to be omnipresent: Internet access is all that is required to consult with "Dr." Watson. Given a set of symptoms by a doctor, Watson scans its database of medical information while cross referencing the patient's medical history. Combining this information, it compiles a list of differential diagnoses for the doctor to evaluate[14].

8 http://www.cnet.com/news/robots-give-a-helping-hand-in-san-franciscos-newest-hospital/
9 http://www.theguardian.com/technology/2015/feb/27/robear-bear-shaped-nursing-care-robot
10 http://www.smithsonianmag.com/innovation/future-robotic-legs-180953040/?all&no-ist
11 http://www.wired.co.uk/news/archive/2015-05/21/brain-controlled-prosthetics-three-years-away
12 http://www.medicalnewstoday.com/articles/264037.php
13 http://www.bbc.co.uk/news/business-29617831
14 http://www.businessinsider.sg/ibms-watson-may-soon-be-the-best-doctor-in-the-world-2014-4/#.VbHgI1-qqko


9. Drone Delivery
Whether carrying first-aid equipment to an emergency or medicines prescribed by a telehealth doctor to a home, drones serve as the primary courier. Cheaper and faster logistics serve as a key tool for a decentralised health ecosystem.
1. Telehealth Centre
Decentralised care means traditional clinics need not exist. Doctors teleconference with the patient and view data sent to them from home-diagnostic equipment. Getting a consultation with a doctor will be like calling tech support for your body.
8. Business Models
Decentralised, personalised, and automated, healthcare provision of the future leverages on an interconnected ecosystem of services and devices to satisfy consumers. Monetising the healthcare businesses of the future requires innovative models.
6. Robo-lab
Trawling through medic
literature, forming resear
hypotheses and then executi
experiment – artificial intelli
guides the labs of the futu
Machine learning automate
processes of pharmaceuti
discovery and innovatio
3. Sensors
A network of sensors dispersed all around the city analyse pollutants, noise levels and human traffic. Primarily used for managing the governance of the city, such data also enriches the understanding of the healthcare landscape that individuals inhabit.
5. Robotic Assistance
Heavy lifting and menial tasks get erased from the job descriptions of hospital staff as robots take over. From helping to care for the elderly to drawing blood, robots allow health professionals to focus on being health professionals.



4. Medical Cloud
Personal healthcare records, aggregated data from wearables, physician's notes– everything health related is accessible anytime and anywhere. Clinical care providers examine the data in real time and identify trends that illuminate patient health.
10. Epidemic Protection
Big data analytics accumulates disease information and correlates this with travel patterns to detect disease hotspots as they are burgeoning. Epidemic protection means predicting patterns and putting up safeguards before the disease takes root.
7. Personalised Medicine/Genetics
Personalised medication for the patient-centred healthcare system of the future. Advances in genetics and drug manufacturing means that every treatment pathway is bespoke all the way down to the medicine itself.
2. Wearables
A smart watch serves to monitor the entirety of someone's day. From food consumption to exercise levels – this is the stream of personalised data that drives healthcare and wellness in the future.

Healthcare Value Innovation

Healthcare costs are increasing all over the world and in Singapore, expenditure is projected to go up to 12 billion dollars in 2020 from an already lofty 9 billion in 2015[15]. Such an exponential rise is not sustainable in the long run. Part of this cost conundrum is the stubbornness of the current fee-for-service model. This model is self-explanatory, basically charging the consumer or their insurer a fee every time a service is carried out. This means that every time a patient has a blood test, a doctor's consultation, an MRI scan, or any other service they would have to pay separately for each component. As a result, these successive costs add up over a protracted period of treatment, especially for chronic diseases. Multiplying such a scenario for every citizen in a country leads to enormous cost and wastage. This is an illogical incentive structure that encourages healthcare providers to subject their patients to as many services as possible. The model values a sick patient more than a healthy patient, resulting in uncoordinated care, duplication of services, and fragmentation.

Value-based care payments and its derivatives are unanimously mooted as a solution to such a problem. Essentially, value-based care means that a healthcare provider is given a sum of money that is estimated to treat a patient over a period of time. For example, in a GP practice, if a patient has diabetes their insurer or government financier might decree that it would cost $1,000 per month to fund this individual's healthcare costs. The provider is then responsible for the treatment and uses the allocated sum while helping the patient achieve their health goals. Any remaining funds then form the healthcare provider's profit margin. In this way, it incentivises the provider to utilise the most cost-effective treatment to ensure the patient recovers in the allocated amount of time. This translates to a greater focus on patient outcomes: quicker recoveries, fewer readmissions, lower infection rates, and fewer medical errors.

Providers, now faced with a healthcare system that demands efficiency on a smaller budget, are encouraged to innovate. Given that payments to providers will not be based solely on patient visits, healthcare providers will be encouraged to monitor their patient population more thoroughly in an effort to prevent costly complications in recovering patients. As a result, they are liable to expand the scope of their care by being in constant contact with their patients. This can initially manifest itself in new channels of communication by means of phone conversations, email, text messages, or social media. Inevitably, the financial incentive to prevent excessive cost will force healthcare providers to engage in a holistic appraisal of their patients. An extensive focus on wellness with the ability to monitor their health in real time inevitably settles into the high tech physical-virtual model of the future.

Building the healthcare infrastructure to facilitate this requires collaboration and foresight. The future of healthcare rests on this decentralised and disseminated data model that is fully integrated and seamlessly coordinated between the patient and the healthcare provider. Future healthcare services will be consumed in a continuous manner, encouraging subscription or freemium based business models focused on value. In seeking to reduce costs, providers will employ high productivity strategies and asset light operations. This relies on the active participation and ownership of the decision making process by the consumer patient. This further encourages the design of the future healthcare model to be centred on the individual. In so doing, greater emphasis is placed on the role of communication and social-professional network interactions within the healthcare system of the future. Pioneering such a system requires a dynamic fit for purpose design that requires robust cybersecurity and governance modules as enablers of this capability.

As the real-time data transfers between consumers and providers that make up this future become a reality, the infrastructure powering this will shift from a novelty to an integral part of daily life. Like the innovations before it, the connected quantified self will soon cease to be an advanced luxury and demand to be a standard of normalcy. It will need to be as ceaseless, reliable and readily available as electricity is from a power socket. Inventing and innovating upon the invisible infrastructure that will transition this vision of the future from conception to inception is the challenge of healthcare 2065.

15 http://www.channelnewsasia.com/news/specialreports/budget2014/news/healthcare-spending-to/1021468.html

Conclusion

Patient centred healthcare: Everything from diagnosis, drugs to devices will be custom designed to seamlessly integrate into a patient's daily life.

Wearables at the forefront: Always on and constantly collecting data, these peripherals are the basis of the medicalised quantified self.

Digitised and decentralised doctors: Improved connectivity and miniaturised diagnostic technology means accessibility and convenience for future medical consultations.

Rise of the machines: Medical robots and artificial intelligence create more efficient healthcare platforms that are powered by the insights of data analytics.

Evolved healthcare provision: Services will now be consumed continuously lending itself to a subscription based business model that focuses on high productivity and asset light strategies.

Contacts

Dr Janson Yap
Regional Managing Partner
+65 6216 3119
jansonyap@deloitte.com

Dr Yong Chern Chet
Director
+65 6216 3346
chetyong@deloitte.com

Ng Zhi Hui
Consultant
+65 6800 2884
zng@deloitte.com

Contributors:

Hygin Prasad Fernandaz
iBSc (University College London)

Siying, Jane Ong
iBSc (University College London)