Digital Consumer Insight

November 2012



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Executive summary

Welcome to the November edition of Digital Consumer Health Insight.

This month we are continuing to see an accelerating stream of new developments and indications that innovation and consumer adoption are accelerating. The support of healthcare systems and government reforms are a key enabler. So far the US Meaningful Use programme has paid out \$8.36bn for the "meaningful use" of certified EHR technology to improve patient care. The programme was introduced in 2009 and was a key catalyst to the wave of digital health innovation emerging now. Today 2 thirds of US primary care physicians use EHRs, this means use is up from less than half in 2009.

The re-election of President Obama provides stability for healthcare innovation and reform through the continuation of established policies. It means that the Patient Protection and Affordable Care Act (PPACA) will remain in place. PPACA incentivises physicians, hospitals, insurers, patients, etc. to act inline with reform. This opportunity hs been seized by entrepreneurs - with the emergence of companies which support changes outlined by reform efforts. The result is sudden and progressive innovation. Already this year 60 PPACA provisions have been implemented, exceeding the orignal target of 57. This is very significant for an often criticised and slow moving healthcare system.

The UK Government also continues to press on with digital. Following last month's announcement of a £100m nurse tech fund a new mandate this month calls for all health records to be made available online by 2015. Home Health continues to make great strides supported by a new initiative from former US President Clinton called Clinton Health Matters Initiative and the launch of Qualcomm Life wireless health platform in Europe.

The sensor market has grown substantially over the last month, in Octover we speculated that the first non invasive continuous glucose monitor could be on the market in 18 months. This month Medisensors announced CE approval of their C8 nCGM which is expected to be released in the next 6 months. Misfit Wearables announced their long awaited product "Shine" which will be available in March, and Scanadu's futuristic vital signs Tricorder plus LumoBack's posture sensor will also be launched in 2013. The alignement of design and benefits with behaviour changes points to a watershed moment for sensors and leads the way for mass market scaling in 2014.

Consumer adoption of digital health is speeding up. This growth is powered by smartphone usage. US consumers using mobiles to look for health information has increased to 31%, up by 82% since 2010. Moreover, 7 out of 10 Americans are self-tracking, demonstrating the growing consumer interest in this space.

Startup activity and funding also remains unchanged with at least 11 companies raising +\$1m. Some of the more established digital health start-ups are growing rapidly with ZocDoc seeing month on month growth of 30-40% and a \$1bn+ valuation. There is even speculation that we may shortly see some of the first digital health IPOs from a couple of start-ups including ZocDoc, Practice Fusion, and Castlight.

November has seen a large focus on data collection and management of electronic health - especially medical records, selftracking of chronic disease, and specialised sensors. We have also seen increased interest in the digital healthcare industry from governments and the FDA. All these developments are fuelled by the growing need to create an even more complete picture of health and wellbeing, while continueing to share this information from a personal HCP-patient level through to a national level.



Consumer trends in digital health

There is a steady growth and interest in health self-tracking among consumers. 70% of Americans self-track, the majority with smartphones: 85% own a mobile, 53% of which are smartphones. A sustantial number of mobile owners use their phone for health or medical information (31%) - up from 17% in September 2010.

2 self-tracking trends:



TREND 1 – Consumers are already tracking¹

- 60% of Americans track their weight, diet, or exercise routine
- 33% of Americans track health indicators (i.e. blood pressure/sugar, headaches, sleep patterns)
- 33% of caregivers say they track a health indicator for their loved one

7 in 10 American adults are self-trackers, with a third of them tracking 'in their heads':

- 20% self-trackers use technology mobile app, a device, a spread sheet, or a website
- 33% use a notebook or journal
- 50% track on a regular basis
- 80% of mobile users say they send and receive text messages, but just 9% of them say they receive any text updates or alerts about health or medical issues

Self-tracking is impacting on people's health:

- 34% say self-tracking insights have affected a health decision
- 40% say it led them to ask their doctor a new question or seek a second opinion
- 46% said it changed their overall approach to health

TREND 2 – Smartphones and apps are a key driver of self-tracking¹

- Smartphones offer the potential to turn head-trackers into real trackers, recording more complete data which can be used to better manage health
- 19% of smartphone owners have at least one health app on their phone, up from 9% in 2010
- Tracking is useful for managing fitness, weight or sleep patterns
- For chronic diseases, like diabetes, it can be essential and can drastically improve care
- A great example of the popularity of self-tracking is the Weight Watchers app, which has been downloaded 10 million times
- 62% of adults living with two or more chronic conditions are self-tracking, but 2/3 don't share the data with anyone
- Just as people will ask Google embarrassing questions they'd never ask their doctor, apps have the potential to offer confidentiality and intimacy that even a doctor can't

As self-tracking via smartphone and online tools continues to grow, the variety of health information tracked will do so also, opening up the market to new entrants

^{1.} Pew Research Center, 2012



Home health

The market for home health disease monitoring was worth approximately \$11 billion in 2008, and is growing approximately 10% annually. Wireless technologies have only just begun to penetrate the market, but have a huge potential. A recent report estimates that 300 million people in the EU and the US suffer from one or several diseases where home monitoring can become a treatment option.¹ This emerging area has recently recieved political backing in the US alongside a steady adoption by hospitals across the states. This adoption is driven by a wide range of incentives, related to everything from demographics and technology development to new advancements in medical treatment.

NEWS

Clinton foundation backs Home Health and partners with GE and Verizon

- This month, Clinton introduced the Clinton Health Matters Initiative (CHMI) which, in partnership with General Electric, Tenet Healthcare and Verizon Communications, aims to promote healthy living in the US by:
 - Providing access to local, scalable solutions for healthy change agents
 - Advancing community health by closing health disparity gaps in underserved areas
 - Engaging the private sector through pledges to improve the health and well-being
- Remote and home patient monitoring technologies are key in eliminating health disparities between communities of different socioeconomic and racial strata
- Verizon will support technologies such as wireless networks so patients can take and send vital recordings from home, as well as systems to alert doctors when chronic disease patients need interventions

(()))Qualcomm Life launches its wireless health platform in Europe

- This month Qualcomm Life, a subsidiary of Qualcomm Technologies, announced the availability of 2net Platform (wireless healthcare service offering)
- The 2net Platform and Hub enables device manufacturers and service providers to wirelessly connect medical devices via a secure, cloud-based solution to biometric information easily accessed by users, healthcare providers and caregivers
- Telbios, a leading service provider of remote health monitoring solutions for chronic care and disease management, is oOne of Qualcomm Life's first European customers
- The 2net Platform enables Telbios to combine data from several devices into one stream
 improving access while sharing patient data, and care coordination
- Over a 100 medical device manufacturers, application developers, healthcare services companies and payors are in integrating with the 2net Ecosystem

In order to pave the way for a wider use of wireless solutions in healthcare, the mobile industry will need to explain that they fulfil all requirements on safety, data security and reliability in the healthcare sector while at the same time delivering better performance at lower cost compared to legacy systems.

^{1.} Berg Insight Report



2 Home Health trends:

TREND 1. US readmissions penalties fuel home health investment

- Last month we reported that 2,200 US hospitals face Medicare payment penalties as of the 1st of October due to high re-admittance within 30 days of discharge
- Hospitals which exceed the ratio will lose a total of \$300 million in 2013
- The University of Mississippi Medical Center, has reduced readmissions for heart failure by having HCPs call patients following discharge: "*It's a fairly simple approach, but it's very labour-intensive*"- Chief Quality Officer Michael Baumann
- One provider has reported a 75% drop in readmisions through use of home health technologies
- Remote home-based monitoring requires little work, is cost-effective compared to the penalties, and data collected is more accurate and detailed
- A pilot programme (Indiana Beacon Community St Vincent) shows impressive results using remote video conferencing between nurses and patients:
 - Enrolled 300 patients discharged with congestive heart failure and/or COPD*
 - Nurses carried out video check-ups 10 times a month, and if needed recorded vital signs daily
 - The study found a 5% readmission rate in the intervention group vs. 20% in the control group

TREND 2. Retail clinics growing in popularity among consumers

A recent National Public Radio and Truven Health Analytics poll found that:

- 2/3 of people would try an in-store clinic, while half said they were aware of a clinic near them
- 80% of people who tried a clinic were happy with the experience
- Although most people who used the clinics also had "regular" doctors, the consumers reported that the clinics were cheaper, more accessible than a doctor's office, and provided the "perceived" same quality care as that received from a physician
- In-store clinics are 80% cheaper than ER and half the price of a doctor's office visit¹
- Less than 1% of outpatient care is handled through such facilities. But as they grow, there will have to be a good, secure fit within the overall healthcare delivery system

Consumers are demanding better access to healthcare at a more reasonable cost. What role will in-store clinics play?

INSIGHTS

Patrick Soon-Shiong's NantWorks announces world's first ultralow power, high speed multi-gigabit wireless chip for mobile devices

- Tensorcom, owned by Nantworks, has developed an innovative Nantoid chip which wirelessly transmits data at an unparalleled speed of 2.5 gigabits per second at less than 100 milliwatts
- This establishes the Nantoid chip as the industry's lowest power chip, and the first in the industry to meet the power requirements for mobile phones and tablets
- "These are cutting edge results that will transform how people across the world use mobile devices. It is truly a game-changer" Ismail Lakkis, CTO and co-founder of Tensorcom
- Currently it takes over 30 minutes and 7% of battery life to download 10 high definition movies (60GB) on a mobile device via WiFi by contrast, the ultralow power Nantoid WiGig chip will take a mere 130 seconds, and consume less than 0.2% of battery life
- The Nantoid chip will be available for sampling in Q1 2013

There hasn't been any specific mention of a healthcare application for the Nantoid chip. However, we believe it's very likely that it'll play a key role in the wider ecosystem of Nanthealth



Machine-to-machine communications (M2M) will be key to enabling assisted living

- M2M: connecting devices to network applications. One of the biggest potential markets for M2M is assisted living apps which help people live more independently and function better
- Based on 'ambient intelligence,' or building environments that are aware of, and can monitor and respond to, people within them
- "Wearable" connected devices, are one of the fastest growing areas in M2M
- Last year, the European Union funded a project, Mainstreaming on Ambient Intelligence (MonAMI), to tested a wide range of ambient assisted living (AAL) technologies, such as:
 - DoorSure, WindowSure and DoorVue (automatic alerts if doo/windows unlocked)
 - AppSure (alerts if kettle or cooker is left on)
 - PresenceVUE and SUREZone (carers alerted of accidents and changes in behaviour)
- According to a recent ABI Research study, home monitoring solutions for seniors will grow to more than 36 million units by 2017—up from less than 3 million units shipped as of 2011

E-visits could lead to overprescribing

- A study published online this month in the Archives of Internal Medicine found that:
 During online appointments HCPs are more likely to prescribe antibiotics, this could be due to precautionary prescribing or an interest in increasing revenue
 - E-visit patients aren't any more likely to need follow-up care
- Study examined: 5,100 visits for sinusitis and nearly 3,000 visits for urinary tract infections
 9% of sinusitis and 3% of UTI visits took place online. During these e-visits, doctors responded to patient concerns and prescribed drugs digitally all through a secure portal

E-visits could lower healthcare spending: \$40 reimbursement rate vs \$69 for a clinic visit¹

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^{1.} American Medical association study on sinusitis and urinary tract infections



Healthcare Practitioner (HCP) tools

The last few months have seen mandates and incentive programs drive adoption of Electronic Health Records (EHR). As part of this changing landscape the use of iPad's within a clinic environment is also increasing, this growth is reflected by the popularity of apps such as Epocrates. The next year will see a real paradigm shift as more and more traditional HCP tools are digitalised.

NEWS

\$8.36Bn in Meaningful Use pay distributed as of last month

- Under the 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act the Medicare and Medicaid EHR Incentive Programs provides financial incentives for the "meaningful use" of certified EHR technology to improve patient care
- EHR Incentive Programs are staged in 3 steps with increasing requirements for participation
- To date an estimated \$8.36 billion in meaningful use incentive payments have been distributed to 165,800 eligible hospitals and health care providers¹

The Meaningful Use programme is a key digital health catalyst which continues to drive investment in EHRs in the US

UK Health records to move online by 2015

- NHS mandate calls for appointment booking, repeat prescriptions, and patient-accessible health records to be made available online by March 2015
- The mandate sets out what patients can expect from GPs, hospitals and the wider NHS, stating that 'clear plans will be in place to enable the secure linking of these electronic health and care records wherever they are held, so there is as complete a record as possible of care'
- The mandate promises that 'significant progress will be made to help 3 million people with chronic conditions benefit from telehealth and telecare by 2017; supporting them to manage and monitor their condition at home, and reducing the need for visits to GP practice or hospital
- The NHS Commissioning Board is tasked with implementation



Epocrates launches a native iPad app version of its landmark drug information app

• Epocrates is the most downloaded iPad app by HCPs, despite Epocrates not having a native iPad app, HCPs have been using the iPhone version, viewing it at 2X the size on iPad screens

• The app, released for iPad and iPad mini, is essentially an adapted version of the existing Epocrates iPhone app, but larger screen allows for new functionality and, makes comparing multiple drugs and drug interactions easier. The app is now live in the iOS AppStore

^{1.} Centers for Medicare & Medicaid Services

HCP tool trend:

TREND 1. US still behind in EHR adoption but the gap is closing¹

- A survey of primary care physicians carried out across 10 countries found progress in use of electronic medical records (EMRs)—particularly in the US
- Two-thirds of U.S. primary care physicians used EMRs in 2012, up from less than half in 2009
- Both US and Canadian doctors expanded their use of health information technology (HIT), though the countries lag behind the U.K., New Zealand, and Australia in EMRs and use of HIT to perform a range of functions, like generating patient information or ordering diagnostic tests
- In the US—the only country in the survey without universal health coverage—59% of physicians said their patients often have trouble paying for care
- In each country, only a minority of primary care doctors reported always receiving timely information from specialists to whom they have referred patients, while less than half said they always know about changes to their patients' medications or care plans

The US has made considerable strides with electronic medical records, but performs poorly when compared with other high-income countries on access to care. The experiences of US HCPs support the need for reform, including enhanced access to affordable care.

INSIGHTS

Practice Fusion announces beta launch of Electronic Medical Record (EMR) for iPad

- The free new platform allows users to securely access patient records, view schedules, browse patient medical records, record vitals and document visits
- "One in four doctors adopting an Electronic Medical Record system today is choosing Practice Fusion because it is free and easy-to-use" - Ryan Howard, CEO of Practice Fusion
- The app works in tandem with Practice Fusion's web-based EMR users can log into both simultaneously and data is updated across Practice Fusion network
- In a recent survey, 36% of all Practice Fusion users reported owning a tablet (65% iPads) and 62% indicated that a tablet was "more Important" or "very Important"
- A survey of entrepreneurs working in digital health suggests that Practice Fusion, Castlight Health and ZocDoc could be the next companies in the sector to go public

The free EMR from Practice Fusion offers healthcare professionals an opportunity to adopt health IT and qualify for Meaningful Use incentives without the investment

^{1.} The Commonwealth Fund

Biometric technology deployed to ID patients

- Biometric technology, such as palm or iris scanning, is in use by US hospitals to identify patients
- Ben Kanter, chief medical information officer at Palomar, said that biometric technology helps to guard against the "*real and serious problem* [of] patients being registered and presenting with different names"
- Some hospitals use iris scanning at registration, so all medical information can be maintained under a single patient identifier that's tied to a biometric ID
- Consumer advocates say that enterprises are employing biometric data to improve convenience — and that the public are paying for that convenience with their privacy
- Fingerprints, facial dimensions and vein patterns are unique, consumer advocates say, and should be treated as carefully as genetic samples collecting such information increases the risk of serious identity theft
- PatientSecure, the company behind vein palm identification, has already scanned more than 5 million patients and are continuing to roll-out the system across the US
- Biometric technology is already in general use in airports and at the work place and will increasingly be deployed in healthcare to reduce costs and optimise work flow

STARTUPS

ZocDoc – helping both doctors and patients make appointments

- ZocDoc, a convenient and free way to find a doctor/dentist and book an appointment online
- The service currently serves 40% of the US population
- Launched 5 years ago ZocDoc is currently valued at +1bn with 30 to 40% growth every month
- This month ZocDoc introduced its first new product 'ZocDoc Check-In'
- ZocDoc Check-in allows the 2 million patients/month who use ZocDoc to fill out their medical forms online in advance of a visit
- Since inception the company has raised \$95m from high profile investors including Amazon's Jeff Bezos, Goldman Sachs and Vinod Khosla
- Competitors include HealthLeap, DocASAP, Doctoralia, DocMeIn, iMediaSante, Skeduler
- A survey of entrepreneurs working in digital health suggests that ZocDoc could be one of the next companies in the sector to go public



mHealth and applications

mHealth and health apps development are being driven by consumer demand and their ability to give valuble insights into chronic conditions such as asthma. Activity in this space has prompted the FDA to develop a set structure for app regulation and approval while storage of data created by these apps has lead to an emerging industry of secure data storage.

NEWS

52% of US smartphone owners seek health information online via mobile

- New research from Pew found:
 - A third of people seek health info on their mobile nearly double since 2010 (17%)
 - 52% of smartphone users seek health info on their phones vs. 6% of non-smartphone owners
 - Younger people, tend to search health info via mobile more than those over 50
 - All demographic groups have increased use of mhealth info seeking except for people 65+
 - Socioeconomics (education, wage) is generally positive skewed toward mhealth info seeking
 - Texting for health remains very limited: 80% of people regularly text but only 9% for health
 - mHealth app adoption has slowed, 19% of people have downloaded at least one mHealth app
- The most popular mhealth apps are:
 - 38% of health app users track exercise
 - 31% track diet
 - 12% use apps to manage weight
 - 7% track menstrual cycles
 - 5% track blood pressure

People who are sicker, caregivers and those who have had a big change in health are also more prone to using phones for health

FD/A

FDA Guidance on Mobile Medical Apps expected by end of the year

- The FDA intends to finalise its draft guidance on mobile health apps by the end of the year
- The FDA's intention is to regulate apps with "very high-risk interventions" that could lead to unintended consequences
- So far, the Center has focused on apps that connect to medical device: i.e. one app cleared is a portable ultrasound machine app that connects to an external device, another is an x-ray app
- Due to feasibility, a risk-based model is used so low-risk apps won't be regulated (e.g. caloriecounting and lifestyle apps)
- Draft guidance, released in July 2011, states that although the FDA has not issued an overarching software policy, it has formally classified certain types of software apps as well as identifying specific regulatory requirements that apply to these devices and manufacturers
- The draft defines a small subset of mobile medical apps that affect or may affect the performance or functionality of currently regulated medical devices. The subset includes apps that are used as an accessory to medical devices already regulated by FDA and transform a mobile communications device into a regulated medical device by using attachments, sensors, or other devices

mHealth to help fuel Rx anti-counterfeiting technologies market to \$1.2bn in 2015

- Counterfeit drugs costs the pharmaceutical industry billions and pose a serious health threat
- A new report by Visiongain predicts that the world market for pharmaceutical anti-counterfeiting technologies will reach \$1.2bn in 2015
- Growth of market stimulated by new industry standards for track and trace technologies
- RFID and 2D barcoding technologies will be key areas of industry and market growth
- The pharmaceutical market for RFID generated \$135.0 million in 2010 and is expected to grow by 17.9% annually to 2017 with a market value of \$427.5 million¹
- One company seeing significant growth is Sproxil. The company's technology enables consumers to verify that products they buy are not counterfeit by using a mobile phone
- Sproxil's technology allows users to scratch off a one-time-use code on drug packets and free text the code to a call center phone number. A response is then sent to the user from Sproxil's servers, indicating whether the drug is authentic
- Similar companies include Kezzler and PharmaSecure backed by Google CEO Eric Schmidt's Innovation Endeavors

mHealth solutions offer significant opportunities for pharma companies to combat Rx counterfeiting

mHealth trends:

TREND1. Patients want to self-serve online²

- A recent survey shows that 90% of patients want to embrace eHealth self-service options
- 46% of patients are not aware if their health records are available electronically
- Many look to the Web for other self-service options:
 - 83% want to access personal medical information while
 - 72% want to book, change or cancel appointments and/or request prescription refills
 - 88% want to receive reminders for preventative/follow-up care via email (in contrast to the 63% who want mobile phone reminders), 64% want to request prescription refills via email
 - 76% want to communicate with their doctor via email and 74% want to use the telephone

Patients are hungry for information, and want the ability to self serve. They are interested in digital self-service, but they still want face time with physicians.

TREND 2. Blue Button Data challenge to allow consumer to access their health records

- In 2010 Obama promised a blue button so patients could download their health data records
- To date more than 1 million Americans have downloaded personal health files
- The hope is that this could lead to improve insight, diagnosis and treatment
- Recent winner of blue button technology challenge is Kinergy health (See startups in mHealth)
- Companies developing blue button technology: Humetrix, TrialX, Jardogs, and mHealthCoach
- Blue button growth will explode with meaningful use i.e. as all providers with these incentives have to provide data for patients to view

^{1.} Frost & Sullivan

^{2.} Accenture

RESPIRATORY INSIGHTS

As most respiratory conditions are chronic their long-term management is vital to treatment success, which is what makes this particular therapy area so suitable for condition management apps. Furthermore respiratory conditions, such as asthma, vary greatly from patient to patient as well as developing and changing over time. These factors make monitoring triggers and fluxuations vital, as data collected has genuine value and can provide key insights which often directly affect treatment and care. There are two notible respiratory apps:

Asthmapolis asthma sensor (FDA cleared)

- An asthma sensor system with associated software for web and mobile phone
- A small and lightweight sensor attaches to the top of an asthma inhaler to track when and where the inhaler is used
- Sensor uses GPS for localisation and Bluetooth to connect to devices and push data to servers
- The Asthmapolis system aims to: provide patients with disease insight, improve patient-HCP communication, and use location data to identify environmental triggers
- The device is currently being used in several asthma studies across the US

iSonea – Technology and tools for asthma detection and management

- The iPhone and Android app from iSonea Ltd. records asthma symptoms and a month of peak flow measurements, it also automatically calls for help during an attack
- Based on data, AsthmaSense issues alerts when asthma is "not well or poorly controlled"
- iSonea helps patients pinpoint the causes and triggers for asthma to improve intervention
- With Acoustic Respiratory Monitoring technology, software and diagnostic algorithms, they provide services for easy and convenient monitoring of wheezing and treatment response

STARTUPS

Kinergy – enabling storing and retrieval of online health information

- Kinergy develops Web portals that HCPs and family members can use to improve patient care coordination
- Allows families and caregivers to securely store health information online and enables health communication for the entire care team
- Recently selected by The Advisory Board Company as the winner of the first prize in the "Patient Engagement Blue Button Challenge"
- Kinergy Health was recognised for identifying a highly-effective driver of real-world patient uptake: enabling the physician to convincingly articulate the value of Blue Button to the patient. This resulted in an unexpectedly high percentage of Medicare patients returning home, registering, and sharing their Blue Button data with health care providers



Sensors and wearable technology

ABI Research has projected that by 2016, wearable wireless medical device sales will reach more than 100 million devices annually. The market for wearable sports and fitness-related monitoring devices is projected to grow as well, reaching 80 million device sales by 2016.

NEWS

1st Non-invasive optical glucose monitor system cleared for sale in Europe

- In last month's report we speculated that the first non-invasive CGM could be in the market within 18 months (see October report Sensors, Insights)
- This month Medisensors announced European CE Mark approval for their C8 Optical Glucose Monitor System which monitors blood glucose using light spectrometry
- Attached to the skin the sensor sends regular readings via Bluetooth to a smartphone, for tight glycemic control and near instant alerts when glucose levels go outside pre-set parameters
- Currently compatible with Android phones and an iOS app is expected to be available next year

Non-invasive CGM is a major breakthrough in diabetes management with a significant potential to disrupt the market

💦 Misfit Wearables announces "Shine" sensor

- Misfit Shine, long anticipated first product from Misfit Weareables, was announced this month
- In addition to tracking walking or running; the small all-metal device is also water resistant so it can track cycling and swimming
- Only slightly larger than a quarter, the sensor comes with a bracelet and a clip and tapping the device turns on lights for an easy visual representation activity level
- Uniquely it synchs by merely lying on top of an iPhone and no re-charging is required as it's powered from a coin cell battery (6 month life, weighing <10g)
- Developed using crowd funding via indiegogo.com, the cheapest pledge for a Misfit Shine is \$79 with shipping estimated for March 2013

If the Shine lives up to the expectations the design principles and simplicity of the concept could create wide appeal and bring sensors to the mass market

Smart wearable devices to be worth over \$1.5bn by 2014

- The next-gen wearable devices market will be worth more than \$1.5 billion by 2014 (\$800 million this year) this is largely driven by fitness, multi-functional devices, and healthcare¹
- 2014 will be the watershed year for wearable devices in terms of roll outs and market traction
- Google, Apple and Nike (see October report Consumer, Nike Fuelband and Apple) have already made key strategic moves in this sector
- The use of wearable devices in fitness and sports has grown rapidly (Nike+ and Fitbit Tracker)
- North America and Western Europe represent over 60% of the global wearable device sales
- Even though the number of fitness and sports devices bought per year is higher than the <u>number of healthcare devices sold</u>, the health sector will be slightly larger in terms of retail value

1. Juniper Research

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Trends in sensors 10 TRENDS - Wearable health tech devices to watch:

1. Danfoss PolyPower A/S

Danfoss PolyPower A/S is developing its electroactive polymer technology with its first design focusing on stretch sensors that safely and precisely measure displacement, such as motions, breathing, swelling, posture etc. – It's ideal for apps within the medical and sports industries.

2. 9Solutions IPCS (not available in US yet)

A wireless Bluetooth and SaaS-based real-time locating system (RTLS) and app platform that enables real-time tracking of people and equipment via mobile devices. For HCPs who need remote assistance and for patients who need to be tracked and able call for help from anywhere.

3. AiQ Smart Clothing

Smart textiles, including a BioMan t-shirt which measures heart rate, respiration rate, skin temperature, skin moisture, electrophysiological signals (EKG, EEG and EMG).

4. Metria Wearable Sensor Technology (Available in the US)

It's wearable sensor uses "skin-friendly" adhesive, collects data (i.e. number of hours slept and breaths per minute) and wirelessly transmits a summary to the user's or caregiver's device. Possible applications include health and wellness, sports and fitness, and cardiac.

5. BodyTel (Available in the US)

Home diagnostics devices - blood glucose meter, blood pressure meter, and scales. Sends data to a home base station/mobile device, which pushes it to online, so HCPs can set-up alerts when data exceeds or falls below pre-defined thresholds (i.e. hyperglycemia or hypoglycaemia).

6. Imec (Prototype available in the US)

Wearable electroencephalography (EEG) headset and EKG patch monitors brain and heart activity. Data is stored or streamed to a smartphone. Prototype available in the US

7. Moticon (Commercially available, but not yet distributed in the US)

Fully integrated and wireless sensor insole which measures distribution and motion parameters. Currently used for patient monitoring, rehabilitation, and training analysis in sports.

8. Nuubo (Commercially available, but not yet distributed in the US)

New-generation wireless and remote cardiac monitoring platforms. The company has a portfolio of wearable medical technologies for cardiac prevention, diagnostics, and rehabilitation.

9. TmG-BMC

Monitors muscle fatigue using a muscle contraction (MC) sensor, measures muscle mechanics directly and selectively under different loads during exercise. It provides feedback on individual muscles for contraction and relaxation speeds, as well as produced force.

10. Preventice BodyGuardian Remote Monitoring System

Preventice, a developer of mobile health apps and remote monitoring systems, recently announced its BodyGuardian Remote Monitoring System (RMS), which has received 510(k) clearance from the FDA. System uses algorithms to support remote monitoring for patients with cardiac arrhythmias. It lets HCPs monitor key biometrics while patients can go about their daily lives. A small sensor attached to patient's chest collects data, including ECG, heart rate, espiration rate, and activity level. The device then transmits data to physicians providing a continual connection between patients and their care teams.

INSIGHTS

FDA clears Chinese iPhone-enabled body thermometer sensor

- A Beijing-based medical device company, Raiing, has been granted 510(k) FDA clearance for their Wireless Thermometer
- The peel-and-stick thermometer sensor transmits body temperature readings to a companion iPhone app
- The device is worn under the armpit and uses Bluetooth to transmit data
- Other companies working on body temperature thermometers using infrared technology include Medisana's Thermodock and CellScope
- Forbes recently reported on a patent filing for another infrared thermometer app from the Fraden corporation
- As a wireless patch that monitors continuously, the device is more similar to Cambridge Temperature Concept's Duofertility device, which tracks women's ovulation cycles by constantly monitoring body temperature

Toumaz and Nantworks begin pilot of wireless plaster in US

- A pilot of a digital vital signs plaster is being carried out at St. John's Health Centre in Santa Monica, California, by Toumaz US, the Group's US joint venture with Dr Patrick Soon-Shiong's company, NantWorks
- The SensiumVitals monitor is a disposable, ultra-thin plaster which continuously monitors the patient's heart rate, respiratory rate and temperature significantly increasing patient surveillance compared to current practice
- The device, which also has an alert capability, enables patients to be fully mobile whilst being monitored, helping to promote patient morale and recovery

Wrist based emotion sensor to diagnose and prevent epilepsy

- Researchers from MIT have found that Affectiva a wristband sensor, launched in 2009 to measure emotional arousal through skin contact, may have application in the area of epilepsy diagnosis
- By measuring changing levels of perspiration, this wristband can tell the difference between an epileptic episode which is relatively safe and one that could be fatal
- Researchers believe that the device will facilitate diagnosis and prevention. It may also cut down on hospital visits as patients will be able to self-diagnose from home
- Supports Bluetooth streaming of data, in addition to logging data on the device
- In market

STARTUPS

Scanadu – building a tricorder sensor

- Scanadu, a Silicon Valley startup, is developing a tricorder sensor for the \$10m Qualcomm Tricorder X-Prize, (chaired by Dr. Patrick Soon-Shiong)
- Scanadu unveiled its prototype Sensor at the Wired Health Conference in New York
- Held to a temple for 10 seconds it measures heart-rate, breathing rate, temperature, pulse transit and oxygenation detection data is then displayed on an iPhone
- Scanadu's hopes to launch its device in 2013 at an "affordable" price for the mass market

Lumoback – back posture sensor

- LUMOback builds wearable technologies to help improve health and wellness
- The first product is a smart posture sensor and mobile app that empowers users to improve their posture and movement activities through a waistband that tracks movement data, and syncs wirelessly to a smartphone
- In addition to the vibrating sensor, the LUMO stick-figure avatar mimics your position to track whether you are sitting, standing, walking, running, laying down, etc., and whether you have good posture
- The company raised \$1.1m in April this year and a further \$200,000 in August via crowsourcing platform Kickstarter
- Currently taking pre-orders and expected to ship in January 2013



'Big Data'

As the industry gets to grips with the sudden production of Big Data, we are seeing the emergence of more companies who are developing tools which use this data to drive new services and health insights. From epidemiology through to the hot topic of electronic health records - the uses and benefits of this data are fast becoming apparent.

NEWS



Nantworks supercomputer platform reduces cancer genome analysis from months to 47 secs

- Dr. Patrick Soon-Shiong, Chairman of Nantworks, announced a revolutionary advance in cancer treatment that will reduce analysis time from 8 weeks to an unprecedented 47 seconds
- For the first time, oncologists can compare virtually every known treatment option on the basis of genetics, risk, and cost before treatment even begins
- Real-time analysis of the largest collection of tumor genomes in the US (6,017 cancer genomes) from 3,022 patients with 19 different cancer types) in the record time of 69 hours
- Traditionally genomic analysis takes 8-10 weeks, this delay is inefficient, costly and may lead to the wrong course of treatment – and thus, higher mortality

Deloitte acquires data warehousing and analytics company Recombinant

- "As we see the movement away from volume-based payment toward outcomes payment, we appreciate that there is a \$700-\$850 billion opportunity to reduce waste in healthcare. One of the ways to get at healthcare savings will be through the use of data. By acquiring Recombinant, we will be able to accelerate into that ability with sophistication" - Andrew Vaz, chief innovation officer at Deloitte
- Recombinant has doubled its revenues every year for the last few years, defying the economic downturn by emphasising innovation in the healthcare industry

New Flu forecasting model uses Google search data

- Combining data that tracks Google flu searches with weather forecasting has allowed two US researchers to develop a model that predicts regional peaks in flu outbreaks 7 weeks ahead
- The pair believe their system can help health authorities, and the public better prepare for seasonal flu outbreaks
- The hope is that flu forecasts will run alongside weather reports on local TV news, prompting people to be more aware of how they feel and to take precautions, such as get a flu vaccine
- The pair conclude their work represents "an initial step in the development of a statistically rigorous system for real-time forecast of seasonal influenza"



Trends in Big Data:

TREND 1. The internet of things to fuel (IoT) vast amounts of data

- IoT refers objects equipped with minuscule identifying devices that can transform daily life
- IoT encompasses many aspects of life from connected homes, cities, cars and roads to devices that track an individual's health and behaviour
- Some predict that by 2025 there will be 1 trillion internet-connected devices dwarfing any other market
- Key elements of the IOT include embedded sensors, image recognition solutions harping upon advanced healthcare technology as well as the creation and management of health records
- One example of a company working on IOT is French startup SigFox, who is creating a cheap, low energy consumption, long-distance cellular network for sensors and other devices
- The worth of business related to IoT technology and applications is rising by 30% each year, and by next year will reach EUR 300 billion¹

So what is going to happen with all this "Big Data"?

- It's likely that users will need analytical capabilities to generate some value from their network of connected devices beyond merely distributing firmware and pushing ads
- All this data will be the foundation of intelligent decision making, and in the near future companies will most likely provide tools to help data clients carry out analysis
- Network optimisation will become even more important as organisations must ensure the right data gets to the right people, at the right time

INSIGHTS

How one hospital uses EHR data to track core measures

- The Medicare and Medicaid Electronic Health Records (EHR) Incentive Programs provide incentive payments to eligible HCPs and eligible hospitals if they demonstrate adoption, implementation, upgrading, or meaningful use of certified EHR technology
 - Now in its second stage, the Meaningful Use incentive program has no doubt increased the number of hospitals and HCPs who are using electronic health record systems, however there is a danger that Meaningful Use program participants will simply "check the boxes" to get their incentive payments without making greater use of data created
 - A more "holistic" approach to data includes clinical data from electronic health records combined with financial and administrative information to provide a well-rounded view of the quality and efficiency of care and then using that information to make strategic decisions
 - "Although most organizations do use data from their EHR systems, not all of them do so well. It's
 not enough to just run reports on that data. You have to use it to improve healthcare quality and
 delivery. We're more focused on using the data that's being generated in managing some of the
 core measures for the Joint Commission. It's driven by the nurses, and their assessment route
 generates a plan that our predictive modeling tool uses to mine the data and remind them to do
 things like administering aspirin. It even predicts the people who may be at risk for falls. So we
 are using [data as a] tool to get our arms around quality improvement." Doris Crane, senior vice
 president and CIO of the eight-hospital system in South Florida

STARTUPS

Ginger.io – Collecting behaviour data to help target new drugs and therapies

- Ginger.io is a behaviour analytics company, and that's using big data from mobile phones to model user behaviour, and make inferences about health and wellness
- Ginger.io is developing software for mobile devices that aims to give pharma companies and providers detailed data on patient behaviour to more effectively target new drugs and therapies
- Ginger.io works with healthcare providers and two of the "top five" pharma companies
- The company received \$1.7 million in startup funding in 2011
- "If you're a pharmacompany, to know a segment is behaving differently and doing better on that drug, that can help you market that medication" Anmol Madan, Ginger.io co-founder

b uBiome – sequencing the human microbiome

- Startup uBiome is the first crowd-funded citizen project to sequence the human microbiome and create a bioinformatics report
- The company is developing a technology to sequence human bacterial DNA with the hope of yielding new discoveries and preventing/treating disease
- Backers will have the opportunity to be tested before UBiome hits the mainstream market
- Users are sent a swab-kit for five sites: nose, ear, mouth, gastrointestinal tract, and genitalia. Each site has a unique microbiome that is home to a specific balance of flora
- The team will use cutting-edge DNA sequencing to analyse samples and in return send custom bioinformatics
- This information will be stored, processed and analysed to make predictions about health



Startup scan

Includes companies:

- 13 relevant digital consumer health companies
- New start-ups or existing small-mid size companies raising funds for new ventures/products in November 2012
- With significant fund raising at +\$500,000 and either have a prototype or first product in market
- US / Europe monitored
- Have received notable press and/or interest

	Area	Status	Funding
VitalPortal	Health portal	Russian version of WebMD - reliable health information that has been reviewed by a HCP	\$3m+
Limeade	Wellness programmes	Online corporate wellness programmes aiming to make employees healthier and happier while cutting down healthcare costs	\$5m+
EarlySense	Bed sensors	Wireless under-mattress sensors which are contact free and remote monitoring systems for patient beds	\$46m
Retrofit	Weight loss programmes	Weight loss programs which use wireless tracking devices, dietitians, exercise physiolo- gists, and access to behaviour coaches via Skype videoconferencing	\$10.7m
OnPoint Medical Diagnostics	Quality processing software	Automates mandatory accreditation process required of hospitals and imaging centers to get federal reimbursement for MRI scans	\$958k
Amplion Clinical Communica- tions	Patient to nurse communications	Wireless in-room comms system for patients and nurses to improve safety and satisfaction	\$3.75m
Beyond Lucid Technologies	Emergency & Ambulance software	Cloud-based mobile platform connecting to hospital EHRs, handling the information hand-off digitally	\$500k
MindBody	Scheduling software platform	Marketing tools, scheduling, analytics, net- working and point of sale services for health, beauty and wellness providers	\$35m+
Quantia MD	HCP collaboration platform	Linkedin type platform for physicians	\$27m+
Reflexion Health	Physical therapy sensor system	System using Microsoft's Kinect motion to help physical therapy rehab	\$4.5m
Independa	Elderly care software platform	Tablet-based app to manage care of elderly patients who choose to stay in their homes rather than move to assisted living	\$1m
Entrada	EHR/EMR add on software	Workflow products that integrate with various EMRs to preserve doctors' productivity levels while implementing record-keeping system	\$1m
InVivoLink	Post operation analysis platform	Tracks and analyses data from medical device implants with the goal of improving the outcomes of implant procedures e.g. hip and knee replacements	\$1.78m

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