The medical devices market and wearable tech companies are very different, but could they learn from one another? By **Kris Sangani**

WEARABLE ELECTRONICS are stealing the limelight at all the big tech shows. However, the concept has been around for some time in both the medical field and fitness sector.

Fauja Singh was the world's oldest marathon runner until he hung up his trainers earlier this year at the age of 101. He is a medical marvel and just one example of where the medical monitoring and the fitness technology markets hold equal relevance.

However, the medical sector and health and fitness fields are divergent in their approach to products and services, mainly due to the fact that the consumer buys their own fitness gadgets while medical devices tend to be procured by healthcare professionals on behalf of their patients.

Bluetooth Smart is enabling hardware companies to link their sensor data with smartphones, allowing for a readily available communications platform for all industries.

Tracking equipment with Bluetooth Smart connectivity means uploading information straight to the cloud using a smartphone rather than a separate, dedicated hub.

Non-invasive monitoring

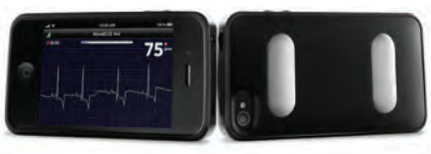
Medical professionals have advocated the integration of medical data from a variety of sensors for years. Blood glucose monitoring, for example, tends to be invasive, typically requiring a blood sample to take an accurate reading. Sensing blood glucose non-invasively is a very difficult task, but companies such as Philips and Siemens have been working on this with medical institutions including Britain's NHS and the US Food and Drug Administration (FDA).

Various solutions – mainly optical-based – are being tested which involve sensors fitted on the earlobe, fingernail or wrist. The difficulty, however, lies in physical chemistry.

Integrity Applications has developed the GlucoTrack non-invasive glucose-monitoring device. The personal ear clip simply attaches to the earlobe to take a reading, which is displayed on the main unit. It uses a combination of ultrasonic, electromagnetic and thermal technologies to obtain blood glucose levels.

The most promising research so far involves a tiny needle patch fitted on the skin that continuously measures glucose levels. This is fitted by the user and lasts for between three and seven days. Strictly speaking this is still invasive, but is far more comfortable for the user.

There are already a few optical-based heart rate monitors for medical applications that have been cleared by the FDA. AliveCor, a system with sensors that attach to the back of a smartphone, is one such example. The user holds the device to the surface of their skin and it takes an accurate measurement



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The AliveCor system measures ECG levels

VICE VERSA

Centenarian marathon runner Fauja Singh took up running and completed nine marathons after his 89th birthday

Bluetooth Smart allows data to be uploaded to the cloud via a smartphone

of their ECG, which is then displayed on the phone's screen. The clinical accuracy of the measurement is comparable with more conventional ECG-based devices.

There is on-going research into measuring heart rate via a patient's wrist. A chest strap with electrodes is still the best way to monitor the electrical signals but several companies recognise that, from a usability standpoint, a wrist-worn device is easier.

"Unlike the fitness industry, there is a higher burden to ensure that the design works to satisfy health authorities," says Vaishali Kamat, head of digital health for Cambridge Consultants. "Both hardware and software has to demonstrate that the patient's readings are accurate."

Healthcare aids

Remote monitoring is still a relatively recent phenomenon. The main beneficiaries, so far, are the elderly, who are less likely to own a smartphone. The UK's National Institute for Health and Clinical Excellence (NICE) has approved several remote healthcare systems including the Philips Motiva, which is at the heart of the NHS Virtual Ward scheme.

The patient's medical data is delivered via a cloud-based server to district nurses who can assess it and make clinical decisions. The data is collected by conventional monitoring systems, which works well for a housebound patient. However, to create a system that would suit a more active person requires the hub to be on the smartphone rather than connected to a router and a set-top box on the TV at home.

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Bluetooth Smart connections are making it easier to create smart hubs. As it is a low-power technology it can run off a simple coin cell, thus making the wireless technology suitable for handheld medical devices.

"To migrate to the smartphone, which would offer cost savings to cash-strapped health authorities, technologies for the elderly need to be designed with that audience in mind," explains Kamat. "Generally speaking, most smartphone platforms are feature rich and many elderly users prefer a simpler interface."

The TV has been a good interface as elderly users are used to it. It is familiar, it has a big display and they can interact with it simply using a remote.

The challenge for companies working on these developments is that the same type of usability has to be transferred to a smartphone app. When migrating to mobile devices, designers will have to scrutinise the number of steps needed to perform a particular task. >

< Another factor is the dexterity and deteriorating eyesight of older patients. For this reason, several health authorities are looking at tablets rather than smartphones.

Data organisation

Fitness devices, on the other hand, generally attract a younger market, with the obvious exception of Fauja Singh. This audience is an easy one to get to as most people under 55, in developing countries at least, already own smartphones and download apps and they are active in exploring new technologies.

The fundamental challenge, however, is not in getting consumers to use a fitness tracker, but it will be getting them to continue beyond a few weeks. Clearly, as with any exercise regimen or diet, you'll only see the benefits if you stick with it.

Another issueis the challenge of getting all the information into one place to analyse properly. There are a few apps that will allow you to connect to dozens of gadgets thanks to the proliferation of Bluetooth Smart. Apps such as Runtastic, Runkeeper and MapMyFitness have opened up their Application Protocol Interfaces (APIs) to enable multiple devices to connect and users to look at their data in one place. With a single, central log-in, you would be able to see all of your data with one click.

Although technical barriers are now lowering, allowing multiple data sets to be analysed, there are further commercial pressures to ensure the availability of information silos. Companies are also bringing out their own apps to boost their own presence and reach to consumers. They guard this information, but the value for the user is always going to be in the integration.

Through the chaos, there may be an opportunity for mobile phone platforms to have fitness apps more ingrained into their design. Samsung has the Galaxy Platform with the S Health app, which is intended to collect from various sensors, while other Gear devices would connect automatically. We will have to wait and see if Apple do anything similar.

Flexible transistors and electronics can be conformed to the body more easily, particularly for use during fitness training. There are, however, advantages beyond the user experience including manufacturing efficiencies as there is, of course, a cost associated with making these devices.

The service game

Although there is already an abundance of health and fitness devices, the market is changing. In the sports and fitness space, for instance, manufacturers such as Fitbit, Polar and Adidas are stepping into the services game, although it is still very early days.

As manufacturers are branching out, we are seeing services platforms being developed. MapMyFitness, for example, was recently purchased by UnderArmour. The company supplies hardware, but wants to move further into the services area with

MapMyFitness. The idea is that this platform will allow any device to connect to the service regardless of manufacturer.

Most people will only run one fitness monitor at any time, but that's also about to change. "Consumers are going to say 'I don't want to go to the Polar app, the Nike app and the Fitbit app in order to piece together a picture of my level of fitness – I want to go to one dashboard'," points out Suke Jawanda, chief marketing officer of the standards-setting Bluetooth Special Interest Group.

Jawanda explains that integrating all devices onto one dashboard requires broad interoperability, something which Bluetooth Smart already does. This data needs to get to several apps and the technological building blocks are all there. MapMyFitness is actually a very broad platform, with a number of hardware partners writing to the app.

The Nike way

Nike + is used heavily by Nike to market its other products to consumers, while some companies are still resisting this kind of integration model.

Historically, Nike had its own proprietary wireless technology. It had to be sent to each handset manufacturer, after which Apple was the only one to initially do anything with it.

Galaxy Gear devices will connect automatically to the S Health app

Fitbit is branching out into the app market as well as its fitness-monitoring devices

Coincidentally, Tim Cook, CEO of Apple, also sits on the board of Nike.

This was ultimately a losing strategy, though, because, predictably, Nike customers have Android phones from various manufacturers. It simply didn't scale.

Most recently, Nike has decided on broad interoperability with hardware. The new Fuelband, for instance, uses Bluetooth Smart and still supports the legacy technology.

From an application perspective, the strategy so far has been to give customers an immersive and exclusive Nike experience. This means Nike devices only talk to Nike applications.

Other companies started that way – Fitbit and Polar are perfect examples of a company focusing on its own apps while also allowing them to link to MapMyFitness type apps.

Ultimately, the consumer is going to demand a similar dashboard approach for their health as they get for their fitness monitoring, rather than having islands of information to piece together themselves. This is not a technological challenge, but there are business models to consider.

It seems that the major players in both the health and fitness markets can benefit from some knowledge sharing – a case of the young learning from the old and vice versa. *