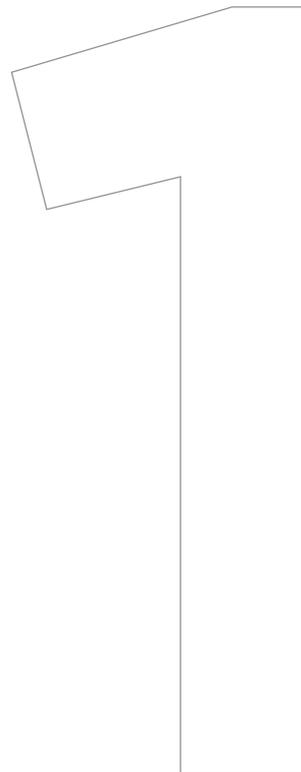
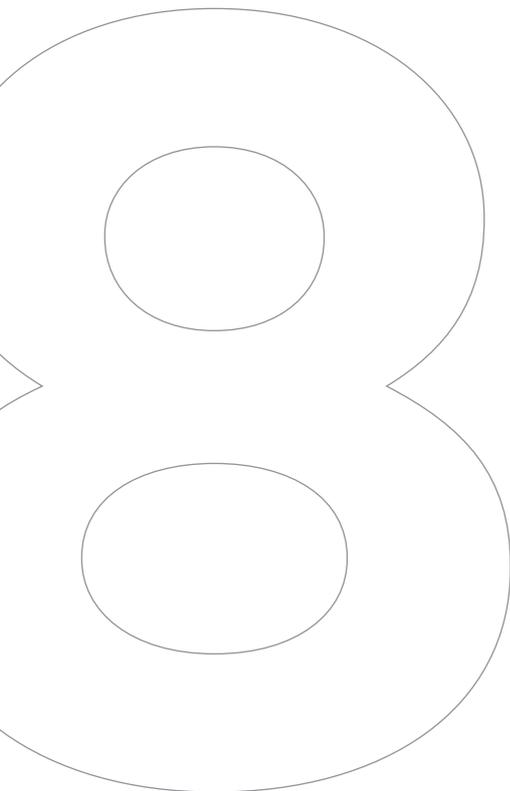


SPRING 2014
—
VOLUME #02
EDITION #09

**THINKING HEALTHCARE
WEARABLES STRATEGY**

—
Function over fashion





02
THE WEARABLES
FRENZY

03
ACTIVITY
TRACKERS

04
TECH WEAR
ISN'T NEW

05
TWIST ON
INNOVATION

06
BIOMETRICS

07
MOBILE MIND
SHIFT

08
SYNCING HEALTH
DATA

09
MAKE THE POINT

THINKING HEALTHCARE WEARABLES STRATEGY

—

Function over fashion



THE WEARABLES

FRENZY



Not so long ago, many healthcare businesses were anxiously asking: what's our social media strategy? In fact, some are still working on that question. Now, tech-savvy people in forward-thinking companies have a new hot issue: what's our wearables strategy? It's a question that has become even more pressing in the wake of CES 2014 and SXSW Interactive where "[wearable tech](#)"¹ was the meme of the moment. In fact, [Intel delivered a keynote](#)² to the gathered geeks at CES focusing on its lines of wearable and perceptual technology. A few weeks later, the mighty chip maker [bought wearables maker Basis](#)³ in a deal thought to be worth around \$100 million.

Wearables are like a wild futuristic fantasy brought to life, so it's understandable if tech insiders and tech watchers feel a heady rush of enthusiasm as they contemplate all the possibilities. The proliferation of wearable gadgets has unleashed a new wave of creative thinking and a whole lot of ideas. Any one of them could catch on in consumer markets and become the next big thing. The wearables frenzy has even prompted a [website](#)⁴ that generates frivolous ideas for satirical effect. While the ideas on the site are deliberately flakey

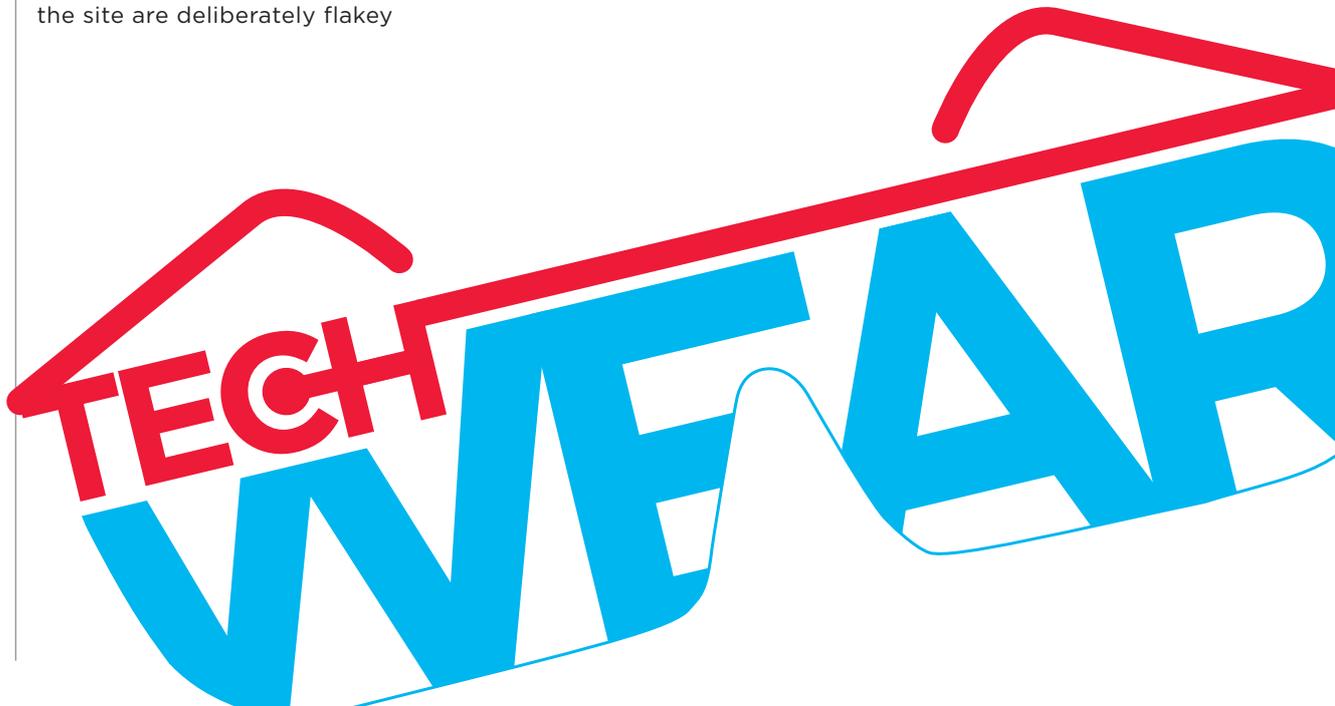
(e.g., T-shirts that glow red when you drink too much coffee, bracelets that throb when you run out of milk), there's a serious truth underlying all of the random combinations. Joking aside, there are an infinite number of ideas that are technically possible with wearables. The hard part is not dreaming up individual technologies and applications; it's finding robust combinations that not only sound cool, but also deliver a winning mix of usability, functionality, and benefits.

1 "Wearable tech at CES 2014: Many, many small steps" by Scott Stein, bit.ly/1hEq8Jb (Accessed: Jan 2014)

2 "CES 2014: Intel abandons smartphones..." by Sebastian Anthony, bit.ly/1aeXQTD (Accessed: Jan 2014)

3 "Intel Acquires Basis For \$100M" by Kelly Clay, bit.ly/1i9ehq6 (Accessed: Mar 2014)

4 bit.ly/1i6PL83 (Accessed: Jul 2014)



SELFIE DATA

TRACKING THE ACTIVITY

"As the population ages there will be a growing need for managing chronic conditions more efficiently and effectively in an increasingly accountable care environment."

Larry Mickelberg Chief Digital Officer, Havas Lynx

A lot of media excitement about wearables has focused on applications for lifestyle and fitness. Activity trackers such as [Fitbit](#)⁵ and [Garmin's vívofit](#)⁶ have become a big hit with gadget lovers who want to quantify the steps they take, the hours they sleep, and the calories they consume. [Google Glass](#),⁷ another high-profile wearable, is a hands-free, head-mounted mobile device that could have come straight out of science fiction. These lifestyle wearables are technically intriguing and answer the deepest desires of the [Quantified Self](#)⁸ movement (“self-knowledge through numbers”), but for most people they're little more than optional “nice-to-haves.”

As [TechCrunch reported](#)⁹ from [CES 2014](#), there's still no compelling consumer case for wearables, especially amid consumer concerns about data security. This paper is not concerned with applications in the general market. Consumers have very few unmet needs, so it's hard for any new lifestyle gadget or technology to earn a place in most people's lives. We believe that the coming big advances in wearable technology will be driven neither by the “wouldn't-it-be-cool” thinking of developers nor by the whims of consumer desire, but rather by addressing real healthcare needs. They will deliver tangible benefits for patients and healthcare professionals involved in the hundreds of millions of healthcare journeys that are inevitable in life, especially in chronic care management. As the population ages, there will be a growing need for managing chronic conditions more efficiently and effectively in an increasingly accountable care environment. This will create a “healthcare ecosystem”

of dynamically linked parts that represents a growing new branch of the economy. In fact, [MobiHealthNews forecasts](#)¹⁰ that US virtual care communication revenues will reach \$13.7 billion in 2018. That's just the revenues from communication in this new space. In the following pages, we will outline ways that pharma and health companies can think strategically about shaping their place in the emerging healthcare ecosystem. The first step is to look at the technologies.

5 <https://www.fitbit.com/uk> (Accessed: Jul 2014)

6 <http://sites.garmin.com/vivo/> (Accessed: Jul 2014)

7 <http://www.google.com/glass/start/> (Accessed: Jul 2014)

8 <http://quantifiedself.com> (Accessed: Jul 2014)

9 “CES 2014 Proves That Wearables Are Still A Work In Progress” by Darrell Etherington, bit.ly/1dHBtmW (Accessed: 12 Jan 2014)

10 “Report: Virtual care communication revenues will reach \$13.7B in 2018” by Aditi Pai, bit.ly/1oS5tqD (Accessed: 18 Feb 2014)



TECH WEAR



ISN'T NEW

Wristwatches and hearing aids have been around for many decades and are used by even the most old-fashioned consumers.

Even the digital angle isn't so new; the International Symposium on Wearable Computers (ISWC) came together for the first time almost 17 years ago [in 1997](#).¹¹ What's new and different about today's emerging category of wearables are three crucial elements.



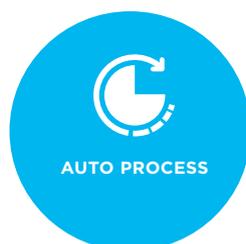
MINUTE SENSORS

The **first** is minute sensors that automatically detect a user's body changes, without manual input. These sensors are becoming so cheap that they're almost throwaway, and so small, light, and powerful that they can get up very close and personal. They can track a user's motion, or gather various types of data including physiological (heart rate), biological (blood oxygenation), and chemical (blood sugar levels).



MOBILE CONNECTIVITY

The **second** element is mobile connectivity. The data collected by previous generations of wearable devices had to be copied across manually. The new generation of wearables automatically transfers data to secure clouds and mobile devices using USB connectors or wireless technologies such as Bluetooth and Wifi. This opens up the scope for continuous, real-time monitoring and reduces the need for users to take action. It also eliminates the errors and omissions inherent in user self-reporting.



ANALYTICS

The **third** element is analytics, which combines the power of both local and remote software to process the large amounts of data gathered by wearables and turn it into meaningful, usable information.

¹¹ Papers from the symposium can be accessed here: bit.ly/1vGanc6 (Accessed: Jul 2014)

THE

TWIST

ON INNOVATION

Innovation in this field has been spurred by the [Qualcomm Tricorder XPRIZE](#),¹² which explicitly references the [Tricorder scanner](#)¹³ used in the science fiction show Star Trek. The \$10 million global competition calls on competitors to develop a mobile solution that can diagnose patients better than or equal to a panel of board-certified physicians—this is a tall order. One candidate is the [Scout](#),¹⁴ a hand-held device from Silicon Valley startup Scanadu. It's roughly the size of a hockey puck but is [equipped with an optical sensor and a 32-bit processor](#).¹⁵

While held to the temple for 10 seconds, the current model [tracks](#)¹⁶ temperature, respiratory rate, blood pressure, and stress levels. Bluetooth beams the data to a smartphone app that interprets it and gives the user advice on what to do next.

GLOBAL COMPETITION

The Scout is certainly impressive but, like a number of technologies that are bracketed with wearables, strictly speaking it's more of a portable health accessory than a wearable. The same applies to [AliveCor's Heart Monitor](#).¹⁷ It clips onto the back of a mobile device and acts as an electrocardiogram, picking up ECG signals by being held in two hands or against the user's chest. The ECG data is converted into ultrasound pulses that are picked up by the microphone on the mobile device. Another twist on existing technology is the [Withings Blood Pressure Monitor](#).¹⁸ It features a battery-powered inflating cuff, which in itself is not a radical departure from traditional BP devices; the difference is that it's highly portable and connects directly to the user's mobile device through a USB connector. Withings offers an array of other connected products, such as a Smart Body Analyzer scale and the soon-to-launch [Aura sleep sensing system](#).¹⁹

¹² bit.ly/1vGbPeE
(Accessed: Jul 2014)

¹³ bit.ly/1i4aepJ
(Accessed: Jul 2014)

¹⁴ <https://www.scanadu.com/scout/>
(Accessed: Jul 2014)

¹⁵ "Scanadu finalizes Scout tricorder design..." by Michael Gorman, bit.ly/R94B24 (Accessed Jul 2014)

¹⁶ "Scanadu secures \$10.5 million...", bit.ly/1lQyoXd
(Accessed: Jan 2014)

¹⁷ <http://www.alivecor.com/what-is-it>
(Accessed: Jul 2014)

¹⁸ <http://bit.ly/1AdAvfU>
(Accessed: Jul 2014)

¹⁹ "Withings Aura active smart sleep system...", <http://cnet.co/1l2LoxC>
(Accessed: Jul 2014)





GOOGLE

BIOMETRICS

By contrast, the finger-tip sensor of the [iSpO2](#)²⁰ comes closer to being a wearable. Using optical sensor technology it detects the user's blood oxygenation, pulse rate, and perfusion index continuously, with data carried through a wire to the user's mobile device. It's certainly wearable in the sense that it can be used continuously, even during activity.

Even more wearable is Vital Connect's HealthPatch, which is stuck onto the chest. It continuously [collects](#)²¹ a range of biometrics including ECG, heart rate variability, skin temperature, body position, and stress, which it transmits wirelessly via Bluetooth. This technology has been integrated into a smartphone app called [SecuraTrac](#)²² that integrates the data and makes it visible to authorised third parties such as caregivers and healthcare professionals.

CONTINUOUS INFORMATION

GOOGLE

Not to be outdone by smaller tech companies in healthcare, Google is developing a [contact lens](#)²³ for diabetics that measures glucose levels in tears every second and transmits the findings via a tiny wireless chip. The idea is to

give diabetics continuous information to manage their blood sugar levels. Even more sci-fi is a system developed by Proteus Digital Health. At its core is an [ingestible sensor](#)²⁴ attached to a patient's medication, coupled with a smart patch worn on the skin. The fluids of the digestive system power the sensor, which sends a unique wireless signal as it passes through the body. The patch picks up the signal along with vital signs such as heart rate, and transmits them to the user's mobile device. The ingestible system is one smart solution for the thorny issue of patient compliance, one of the most intractable problems in a healthcare system where as much as [50% of medication is not taken as prescribed](#).²⁵ Not only does the system check that the medication is taken, it also tracks the patient's response to it.

²⁰ <http://www.ispo2.com> (Accessed: Jul 2014)

²¹ <http://www.vitalconnect.com/features> (Accessed: Jul 2014)

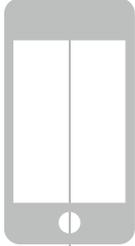
²² bit.ly/RUmpyF (Accessed: Jul 2014)

²³ "Introducing our smart contact lens project", bit.ly/LcvX4l (Accessed: Jan 2014)

²⁴ bit.ly/1npJ6EY (Accessed: Jul 2014)

²⁵ "Ingestible Sensors Signal New Era of Digital Medicine" by John Foley, onforb.es/1mYczrx (Accessed: Aug 2014)

M  B I L E

M  N D

SHIFT

PULLING DEVICES AND DATA TOGETHER

These are just a few examples of an already impressive range of portable and wearable devices for healthcare. Over the coming years, many more will be created. In fact, it's quite conceivable that some will use technologies that don't even exist yet.

On the other hand, it's highly likely that whatever sensor technologies are used, they will still relay their data to smart phones or similar mobile devices. They're the crucial nodes in the healthcare ecosystem for several reasons. Firstly, they are increasingly becoming a normal part of everyone's daily life. They are the one item of technology that most people have with them virtually all the time, everywhere. They are at the heart of what has been called "[the mobile mind shift](#)",²⁶ in which people expect to access any information they want at any time on a mobile device. This makes them dependable, always-on data relays between micro and macro, and between users and analytics in the cloud. Users habitually look at their mobile devices for a whole range of updates, so they're ideal for enabling users to monitor their biometrics in real time. They're also the perfect platform for delivering tips, hints, and nudges.

One example of many players in this space is Omada Health's [Prevent](#),²⁷ a 16-week Diabetes Prevention Programme mediated by an app that combines digital tracking tools, personalised coaching, and social support. The programme's creators reckon to have scored 80% completion among people who start it, with participants achieving weight loss averaging between 5% and 7% of their body weight.

CASE STUDY



HeartMath

Another key attribute of ever-present mobile devices is their ability to augment and extend body awareness. Many people typically ignore or don't recognise the subtle physical signs of increasing stress, irregular heart rhythms, or excessive blood sugar. Picking up these signs and presenting the data in the form of games, comparisons, and graphics makes it all more understandable and meaningful to users. When it's shown in real time as biofeedback, it can help users to learn new health behaviours. HeartMath's [Inner Balance](#)²⁸ uses this principle with an earlobe clip-on sensor to track heart rate variability (HRV) and cardiac coherence scores in real time on a mobile device. The app provides visual and audio cues to help the user improve performance.

²⁶ "Quality vs Frequency: What's Your Mobile Strategy?" by Josh Bernoff & Melissa Parrish, bit.ly/1vGfIXz (Accessed: Jun 2013)

²⁷ <https://omadahealth.com> (Accessed: Jul 2014)

²⁸ bit.ly/1oSavTT (Accessed Jul 2014)

SYNCHING

HEALTH

DATA

Whether or not real-time biofeedback is involved, tracking healthy behaviors on a mobile device creates awareness of those behaviors and helps users pay attention to them. This makes mobile devices ideal for providing the triggers that are one of the three elements essential for behavior change, along with motivation and ability.

HEALTH CLOUD

Seeing the massive opportunity here, WebMD recently [partnered](#)²⁹ with Qualcomm to create a new WebMD Health Cloud that will help collect and sync health data. WebMD will utilise Qualcomm Life's [2net™ Platform](#),³⁰ an FDA-listed, Class I Medical Device Data System (MDDS) that enables end-to-end interoperability for medical devices and apps, to aggregate wireless health device data into its network of mobile apps and websites, allowing customers to better understand and effectively use wireless health data.

For healthcare professionals it's bonanza time. Tracking health-related data is becoming easier by the week; there are hundreds of devices and apps already on the market, and new ones coming out all the time. Gathering and transmitting that data is no problem, thanks to mobile devices. Monitoring individual data streams is easy as most devices and apps come as part of a self-contained system with a dashboard to display data across platforms: desktop, tablet, or smartphone. However, the trouble for both healthcare professionals and for individual users is

that all this data is scattered across different systems. To be useful for serious healthcare purposes, it needs to be integrated securely. To date, this is an open field with very few players where the advantage is likely to go to early movers such as [Validic](#).³¹ This North Carolina start-up is shaping up to be a frontrunner in collecting data from nearly 100 (and growing) health-related apps and devices, and putting it together in HIPAA/PHI-compliant, standardised formats for healthcare companies.

MAKING WEARABLES FIT

Healthcare professionals are well advised to keep track of what's happening in hardware, software, integration, and adoption. In fact, they should make a point of trying out some devices and wearables personally and finding out first-hand what it's like to use them. Even so, knowing about the technologies in theory and having a little personal experience is one thing; putting them to work in real life is another. So what's the best play for someone looking to apply wearables? There's no sure-fire recipe in this nascent space, but there are some solid principles.

²⁹ "WebMD and Qualcomm Life Launch Strategic mHealth Collaboration", prn.to/TucnWt (Accessed: Mar 2013)

³⁰ bit.ly/1g8uubi (Accessed: Jul 2014)

³¹ <https://validic.com> (Accessed: Jul 2014)



MAKE

THE

POINT



1) SOLUTION

Let the solution lead the technology. Start by defining what you want to achieve, and then look at how you could achieve it.

- Look at problems that can be addressed by current technology. Right now, this is more around biometrics than test results. So in the market as it stands, this means defining your problem in terms of what can be assisted with real-time, mobile information. Bear in mind that not every challenge your target is facing can be helped by real-time data
- Review the current top devices and apps. No one has huge penetration at the moment, but it probably makes sense to start with early winners
- Get clear about your target's behavior. What behavior are you seeking to change with your envisaged solution? How embedded is that behavior? What new behavior are you seeking to foster? What are the likely barriers to embedding that new behavior?

2) OFF-THE-SHELF

Use off-the-shelf technology rather than inventing your own.

- You may well be able to take a couple existing pieces and find a way of combining them together, such as using Validic to combine data from multiple devices. Beyond that, beware. Things are moving too quickly for anybody but deep geeks to hack or modify existing devices

3) DEFINE

Define the purpose of the data you aim to collect. The prospect of accessing massive new data streams can be very alluring, but the reality may be overwhelming if you haven't planned realistically.

- What will you do with the data? What problem are you looking to solve, and how will the data help you do that? In addition, how will you maintain HIPPA compliance at all steps with the data?

- Is the data actionable and needed in real time? For example, some targets with diagnosed or suspected heart conditions may benefit from continuous real-time heart rate data collection, but for most targets occasional data collection is enough

4) COMPLETE

Think in terms of a complete, valuable experience in which wearables and devices play a part. To coin an analogy, a high-tech adjustable bed may well make a hospital stay smoother and more comfortable, but your experience of the stay is about a lot more

- How will your target find out about your solution? What benefits does it offer that will motivate them to take action? How will they register for it?
- What will they have to do to use the solution? How much inconvenience, effort, and remembering will it take for them to integrate the components of your solution?

Above all, your thinking about devices should be guided by three key considerations: functionality, usability, and benefits:

- **Functionality:** what function(s) does the device serve and how well? What is the quality and relevance of the data it provides?
- **Usability:** how easily and reliably can the target use the device?
- **Benefits:** what does your target get in return for what they have to do? What's in it for your company?

