

Tech Trends 2014

Wearables

Wearables

On-body computing devices are ready for business

Wearable computing has many forms, such as glasses, watches, smart badges, and bracelets. The potential is tremendous: hands-free, heads-up technology to reshape how work gets done, how decisions are made, and how you engage with employees, customers, and partners. Wearables introduce technology to previously prohibitive scenarios where safety, logistics, or even etiquette constrained the usage of laptops and smartphones. While consumer wearables are in the spotlight today, we expect business to drive acceptance and transformative use cases.

WEARABLE computing technology, dating to the 1960s' helicopter pilot head-mounted displays, is not new.¹ Even the familiar office identification badge is a type of wearable. But with recent materials science advances driving technology miniaturisation and battery improvements, we're standing on the brink of widespread adoption.

Wearables are devices worn on the body in items such as watches, glasses, jewelry, and accessories. Or in the body – ingested or surgically implanted. They consist of three modular components: sensors, displays, and computing architecture. A wearable device may include one, two, or all three functions. A smart watch may contain narrowly purposed sensors that gather data about the user and his or her environment, but it may have limited display functionality and no computing power. Computing may occur in the cloud or on a multipurpose device such as a smartphone. The display may be on a nearby screen or in a pair of smart glasses, or it may even use an earbud or pendant for verbal response.² Think of wearables as an ecosystem – expanding capabilities that are individually interesting but more compelling when combinations are

harnessed. This modularity is allowing new manufacturers to enter the market, driving demand from both consumers and enterprise users.

The mobile revolution placed powerful, general-purpose computing in our hands, enabling users to take actions in the digital world while moving about in the physical world. By contrast, wearable technology surrounds us with devices that primarily enable other devices with digital information, which in turn support us in taking real-world actions.

So why move forward now?

Few enterprises have tapped the full potential of smartphones and tablets, and many IT organisations are still learning how to design and build elegant, intuitive mobile apps. Also, the enabling infrastructure required to secure, deploy, manage, and maintain mobile assets is still being developed.³ And many industries are just learning how to think beyond today's business scenarios: how to, instead of veneering existing processes and systems, come up with new ideas and even business models that were not

previously possible. With so many opportunities left to explore using conventional mobile devices – smartphones, tablets, and laptops – why should business leaders consider another wave of investment?

Wearables' value comes from introducing technology into previously prohibitive environments – where safety, logistics, or even etiquette have constrained traditional technology solutions. Wearables can be the first seamless way to enable workers with digital information – especially where hands-free utility offers a clear advantage. For example, using wearables, workers in harsh environmental conditions can access data without removing gloves or create records without having to commit data to memory and then moving to a sheltered workstation.

The primary goal of wearables is to enable users to take real-world actions by providing relevant, contextual information precisely at the point of decision making. Wearables shine in scenarios where using a laptop, phone, tablet, or other conventional device may not be appropriate⁴ as well as in making use of the data gathered by sensors. Meeting this goal requires generating data in real time and intelligently pushing it to a device or devices according to the user's current context – just-in-time digital logistics. These use cases suggest that wearables may be most valuable deep in an organisation's operations, rather than in customer-facing applications.

Making sense of sensing

Wearables can also form a bridge to related disciplines. Augmented reality (AR), for instance, overlays digital information onto the real world. Many smart glasses scenarios feature AR concepts, and overlaying reference images and graphics can be a powerful enhancement to wearables. Likewise, the Internet of Things (IoT) refers to the explosion of devices with connectivity and – potentially – intelligence. Be they motors, clothes on a retailer's shelves, thermostats, or HVAC ducts, IoT is rapidly adding to the context map that will amplify wearables' impact.

Sensors permeate the Internet of Things and are a leading focus of consumer wearables. This is especially true in the “quantified self” movement in which bracelets can gather personal data or sports gear and clothing can help monitor health. Consumer-facing enterprise applications, such as beacons that affect the behavior of wearable displays or smartphone apps, rely on consumers being surrounded by a network of always-on sensors.

Corporate uses of sensors may include temperature readings of an employee's environment or sleepiness indicators for fleet drivers. These sensors are not necessarily smart by themselves; rather, they harvest data that is processed and displayed elsewhere.

Going to work

The potential uses for wearables are staggering. In Australia, firefighters are being outfitted with a data-transmitting pill that can detect early signs of heat stress.⁵ Health care insurance companies may offer policy discounts for members who quantify their healthy lifestyles by wearing fitness-tracking devices, similar to auto insurance companies' in-car efforts to track safe driving habits.⁶ On the manufacturing floor, workers may be able to view metrics for nearby equipment on a smart watch. AR overlays in a warehouse can guide a worker who needs to find, move, pick, pack, and ship a particular product. Field installation, service, and maintenance professionals are being outfitted with smart glasses to access documentation, procedural tips, and skilled advice – from the top of a communications tower or beneath a boiler.⁷

Similar potential exists on the consumer side; Gartner predicts that “the worldwide revenue from wearable electronic devices, apps, and services for fitness and personal health is anticipated to be \$1.6 billion in 2013 increasing to \$5 billion by 2016.”⁸ But the market is –and will likely continue to be – highly fragmented. This fragmentation is inherent in a modular ecosystem, reflecting the lack of widely adopted technology standards.

More than two dozen manufacturers are aggressively pursuing head-mounted smart glasses. A dozen smart watches are already in the market. And new devices are launching virtually every day – from sensor-rich socks⁹ to Bluetooth-powered rings to digital tattoos.¹⁰

Luckily, although the lack of industry standards in wearables can lead to policy headaches, a number of uses for wearables can be enabled using tools and governance processes similar to those needed for smartphones and tablets: device management, identity and entitlement management, security policies, content management, and app provisioning. Privacy concerns need to be managed – even though wearables are likely to be more readily accepted in the workplace than in public situations.

It's important that employees perceive that the tool will help them perform more effectively on the job. Over time, social and workplace tolerance may increase, but during these early days, acceptance is a factor that must be considered. But enterprises should not wait for consumer markets to settle and conventions to be established. Because the wearables ecosystem can benefit from the proliferation of niche players, companies don't need to hold off until marketplace standards or leaders emerge. The door is open to early experimentation – and to usher in the next wave of mobile innovation.

Design principles of wearables



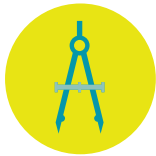
CONTENT

Ascribe to (much) “less is more” for content and its delivery – the design facilitates exceptionally low duration, high frequency use.



COMMUNICATION

Focus on communicating rather than simply displaying data – not necessarily visually, and not necessarily via the device generating the notification.



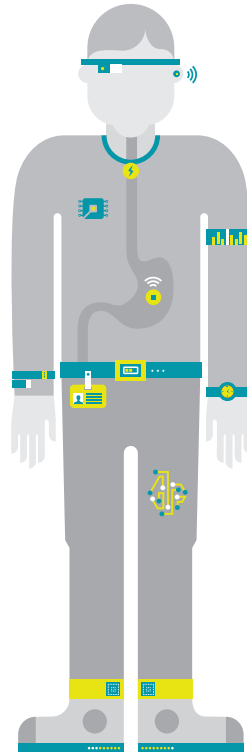
INTENTION

Use persistent design elements, alerts, just-in-time information, and notifications with discretion.



INTELLIGENCE

Are fueled largely by intelligence from analytics, big data, and sensors, which are often embedded in other devices.



INFLUENCE

Do not force new behaviour, but allow users to adjust their future behaviour by providing new information or capabilities.



INTERACTION

Are careful about requiring response from the user – interaction with the device should be minimal and expedite the user's manual actions.



ENHANCEMENT

Leverage the digital world to enhance the user's behaviours, actions, and experiences in the real world.



NETWORK

Communicate with an expanding community of wearables, data, devices, systems, platforms, services, and software.

A flying start

Award-winning British airline Virgin Atlantic has a long tradition of technology innovation, particularly when it comes to customer experience. As the first airline to install seatback TVs in all cabins, to allow mobile connectivity and SMS texting on board, and to offer drive-thru check-in; it's hardly surprising to see that Virgin Atlantic are now the first airline to be trialling wearable technology in a bid to deliver their most personalised customer service yet.

The trial follows a recent Virgin Atlantic study of 10,000 people worldwide, conducted to understand what passengers are looking for in the future of air travel. Dave Bulman, Director of IT at Virgin Atlantic says: "What was interesting about the results was that, aside from the comfort aspects of air travel such as the food and seating, a lot of the responses focussed on how *technology* could touch a passenger's journey – essentially improve it and make it more interesting."

Reflecting on this insight, Bulman tasked the innovation arm of his IT function to find opportunities to trial new innovative technologies that could help fulfil some of these passenger demands. Working with air transport IT specialists SITA, the team agreed that wearable technology was an exciting opportunity worth investigating. Says Bulman "Wearable technology seems to be a key area of interest to consumers and it potentially provides us with opportunities to help really differentiate the service we provide. However, it was a bit of a case of "here's some really interesting technology, what can we do with it?"

So Bulman's team set out to design a simple pilot scheme that could trial wearable technology, in a self-contained environment, over a set period of time. Having engaged with other parts of the business to test the feasibility of the scheme and to ensure the right data feeds were available, a pilot was launched in February 2014.

Set to last six weeks, the trial compares the use of three different types of wearable technology: Google Glass, smart watches and smart phones. It is initially aimed at concierge staff in the airline's Upper Class Wing and tests the functionality of the devices as well as different data flows to see if and how they can improve the customer's travel experience and journey efficiencies.

One key feature of the technology allows staff to personally greet passengers by name as they step out of their chauffeured limousine at Heathrow – part of the Virgin Atlantic Upper Class service. Either via Google Glass, a smart watch or smart phone, staff also have access to the passenger's flight information and any anticipated flight disruptions, their meal preferences, the weather and local events at their destination, and the number of passengers travelling in their party. Bulman highlights "What is critical is, not only the information that we are providing, but testing if it is enhancing or getting in the way of personal interactions between the check-in agent and the passenger". Where pieces of information are proving to be less valuable in customer interactions, they are removed from future process flows.

Security is also an important aspect of the trial. Despite the fact that currently only a limited amount of data can be stored on wearable devices, keeping personal and private information secure is a top priority for Bulman's team.

Customer reaction to the trial is so far said to have been generally positive. And as the trial focuses on some of the airline's most frequent travellers, familiar with the traditional check-in process, the difference in experience is immediately noticeable. Bulman says "Mostly people are absolutely intrigued by the technology to the point where passengers are even asking to try the glasses on. Generally the response has been "Great, that has just made my journey easier".

Although still at very early stages of exploration, if the current pilot proves effective, Bulman predicts wearable technology could be rolled out at other airports, and even with other members of Virgin Atlantic airport staff. Says Bulman "We do have some other ideas that we want to test as well, for example using wearable technology to interact with customers in our airport lounges, or for adding further efficiencies to the flight turn-around process. I believe there are some key areas where these devices can be revolutionary."

Where do you start?

WE expect to see an escalating number of wearable computing devices, platforms, and applications that can enable and transform business operations. Now is the time to begin exploring the possibilities that wearables hold for improving supply chains, workflows, and processes to drive down costs and increase competitiveness.

- **Imagine “what if.”** Think about how your business’s effectiveness could improve if workers had the information they needed at the moment they needed it. What current processes could be discarded or refined? What could people accomplish if a photo or video could replace a paper report? What critical processes—for example, emergency procedures – are difficult for workers to master because they are rarely needed? What if employees could have specific instructions for those procedures delivered at the point of impact? What if a worker had ready access to equipment manuals while repairing an oil rig or bridge cable? What if a worker in the field could show a remote colleague real-time video from his or her point of view – while leaving his or her hands free?
- **Kick the tires.** As new wearable devices and software applications appear, experiment with various platforms and evaluate the organisations behind them. Do they fit your business operations? Is the vendor viable for the long term? Do you have a pool of early adopters who will likely embrace the technology? Remember that wearables are a modular ecosystem, so if one component doesn’t measure up, the system can adapt to accommodate other players. Experimentation is the name of the game.
- **Become an early adopter.** Connect with wearable manufacturers and software developers to share your business’s operational needs and explore the possibilities of working together to develop solutions. As companies are looking for beachheads in this new world, there are opportunities for teaming.
- **Simplify. Simplify. Simplify.** In design, wearables need to be treated as their own beast. Just as the design patterns from desktop, laptop, and the web were not well-suited for smartphone and tablet use, a completely different experience should be designed for wearables. Simplicity is the ultimate form of sophistication, and transparency is the ultimate form of simplicity. User interaction should be kept to a minimum. If a use case requires an explicit user response, it should be limited to spoken commands, gestures, or a gloved knuckle tap. Minuscule displays require discipline in not only what information should be displayed but how to present it; a two-tone simplified graphic can be more effective than a detailed photo. Time sensitivity becomes important, so create “glanceable” awareness of information in the applicable context. The information displayed should be curated to precisely fit the immediate situation or task, with no extraneous data. This extends to the purpose for which a device is used: Don’t design a wearable experience for a function that’s more effectively done on a smartphone, a tablet, or a piece of paper.
- **Anticipate data and device management.** Data generated by wearable devices could exponentially increase the quantity of information that your IT organisation should store, manage, and analyse. The volume of unstructured data, including pictures and videos, could also escalate. Also, consider how these new devices will be repaired and managed. Assume that bring-your-own-device (BYOD) will happen whether policy supports it or not and that new classes of devices will likely become smart before IT can redefine policies

to manage them individually. Strive for simple rules that can govern ever-more-complex behaviours.

- **Engage the workforce.** Ask frontline employees to participate in the imagination process. What persistent problems would they like to solve? What opportunities could be created? Likewise, ask them what concerns they have about the devices, and develop plans to

address those concerns. Talk with trade unions and other worker groups to understand and address concerns they may have about using wearable devices. Over time, social and workplace tolerance may increase, but during these early days, focus on employee education and constrain your use cases to those that provide demonstrable benefits to the user.

Bottom line

Wearables targeted at the consumer market are today's media darlings. Google Glass Explorer parties and Samsung's Dick Tracy-style watches make for interesting copy. But unlike tablets, which were introduced to the enterprise by consumers, we expect businesses to take the lead in building acceptance and demand for wearable computing devices. As consumer devices, wearables represent a very personal buying decision in which aesthetics and fashion are almost as important as function. But in the workplace, experience and engagement matter. Function can trump form – as long as a wearable is perceived as unobtrusive, safe, and not “creepy.” The challenge is easy to articulate: Rethink how work could get done with the aid of an ever-present computing device that delivers the desired information when it's needed. Organisations that get a head start could gain an advantage over their wait-and-see competitors.

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