



# Enterprise Wearables: Wearing Our Parts On Our Sleeves

How Wearable Technology Will Benefit The Enterprise

In 2015, the world of wearable technology will benefit from the effects of two major forces:

1. first, an increasing awareness of the value of wearable devices in corporate/enterprise use cases; and
2. Apple's media campaign for the Apple Watch, intending to educate the public about the value proposition of a smartwatch.

Parenthetically, one could also argue that the second point will create a third force: peer pressure. All the cool kids will be wandering around with Apple Watches; you should too.



**The “Apple factor” should not be underestimated. For comparison, the introduction of Apple Pay had a dramatic effect on the mobile payments landscape. Ars Technica wrote: “Google Wallet, which launched back in 2011 and saw tepid success in the ensuing three years, has had considerable growth [since the announcement of Apple Pay].” Apple has mastered the art of making new technology hip and trendy, and really driving home to consumers why they want to try/own the latest newfangled thing.**

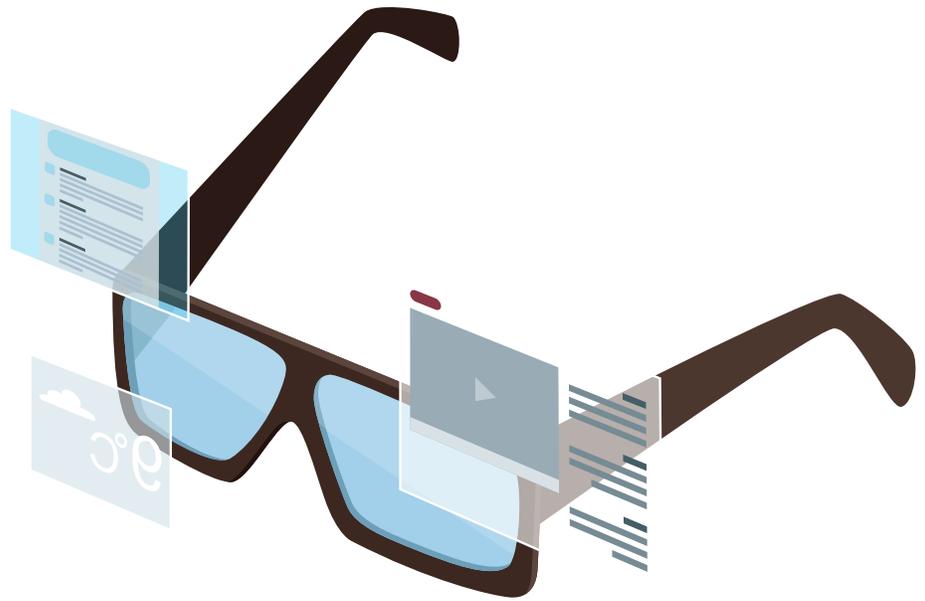
**Business Insider Intelligence argues that the Apple Watch will be the device that kick-starts the growth of the smartwatch market, and that in 2015 alone Apple Watch will account for 40% of sales.<sup>1</sup>**

The biggest barrier for the wearable industry is that most consumers don't currently see the value of wearables. In general, wearables seem like devices that can do stuff that smartphones can already accomplish: if I have a smartphone, why would I need a smartwatch, or other wearable device? In a survey of reasons why consumers might not want to buy a smartwatch, BI Intelligence found that just over half of the respondents didn't see the point.<sup>2</sup>

But it's precisely that barrier that those two forces are operating on. Apple can be expected to sell consumers on the “point” of an Apple Watch. And at the same time, enterprises are beginning to see the business value proposition of wearable devices, and will begin using those devices in the workplace. And as people become familiar with wearables in the workplace, they'll have a real sense of the value of these gadgets.

<sup>1</sup>We Surveyed People About Smartwatches And Their Answers Reveal Why This Market Will Be Small. Business Insider. Dec. 16, 2014. <http://www.businessinsider.com/wearable-smartwatch-market-report-2014-11>

<sup>2</sup>Now that the Apple Watch has been released, here's how we see it doing. Business Insider. April 13, 2015. <http://www.businessinsider.com/apple-watches-big-opportunity-ahead-of-apple-watch-event-2015-3>



Now because of the combination of those two major forces, BI Intelligence argues that the wearables market will grow at a compound annual rate of 35% over the next 5 years, culminating in a 148 million units shipped globally in 2019.<sup>3</sup> IDC argues that Canada, alone, is expected to see 8.5 million units shipped by 2018.<sup>4</sup> Again: one of the key findings of the IDC survey is that wearable devices need to show their value to the Canadian consumer: it's not enough to be shiny and new; wearables need to emphasize what they provide over and above the capabilities of smartphones.

So let's talk about what makes wearables different than smartphones. While the precise definition of what is and what isn't a wearable is fuzzy, for the purposes of this paper, I'd suggest that we're interested in the devices that include one or more of the following features:

1. Support for hands-free use (using, for example, heads-up display or hands-free gesture recognition);
2. Support for automatic video and/or audio capture or streaming;
3. Provides a virtual reality interface; and/or
4. Inclusion of specialized sensors to measure information about the user.<sup>5</sup>

There are other products that bill themselves as wearables; consider for example the MeU, a garment accessory that creates an LED display to output text or designs on or immediately underneath clothing or bags. These kinds of products are interesting for makers and rave-goers, but aren't really a major part of the wearable trends that we're discussing in this paper.

We expect that some of the first industries that will start to embrace wearables will be healthcare, retail, field work, sport, and financial services. CIBC and Bank of Nova Scotia subsidiary Tangerine have already announced that their respective mobile apps will be accessible to Apple Watch users, offering the ability to check balances, transfer funds or search for a nearby ATM. While the adoption of wearable-based solutions in the enterprise is still in its infancy, this area is exploding fast; our interest in producing this paper is rooted in giving enterprises a glimpse of some of the ways that these new devices are creating value.

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<sup>3</sup>THE WEARABLES REPORT: Growth trends, consumer attitudes, and why smartwatches will dominate. Business Insider. Apr. 20, 2015. <http://www.businessinsider.com/the-wearable-computing-market-report-2014-10>

<sup>4</sup>Canadian Consumer Wearables 2014–2018 Forecast. Idc. May, 2014. <http://www.idc.com/getdoc.jsp?containerId=CA8MS14>

<sup>5</sup>There may be a fifth category, relating to augmenting the capabilities of the user: for example, the strength-providing exoskeletal systems that are being entertained in the US Army's Future Soldier 2030 Initiative. Exoskeletons to restore or improve mobility for people with disabilities is another example. At the moment, however, these cases appear to be a bit farther away from general availability than many of the products we're discussing.

## Enterprise Value Proposition

As I've already argued, wearables offer a number of benefits for enterprises which can be more or less quantified.

Here are some examples of the value that can be gleaned.

### Education and Training

Many of the graphics capabilities that the video game world take for granted originated with training simulators for the airline industry, so there's a long-standing relationship between education and new technology.

Wearables can influence training in three very distinct ways:

1. By providing new ways of experiencing learning materials. Examples:
  - The US military is keenly interested in the use of VR technology for training simulations for its soldiers.
  - Smartglasses can video stream early surgeries of surgical residents (either for later review, or just for teacher oversight).
2. By minimizing the need to train workers on processes if information about the processes are always available. Examples:
  - In much the same way that Automated External Defibrillators guide users through the emergency procedures involved in defibrillating an accident victim's heart, wearable devices can make step-by-step instruction data more quickly available. The focus of training, then, can shift from teaching student the process steps, to teaching them how to call up the processes.
3. By providing targeted on-the-job assistance for new hires. For example:
  - New hires in a warehouse environment might take time getting up-to-speed about the layout of the warehouse (and where particular products are kept), but a heads-up display can provide directions to the physical location of a particular SKU, thereby improving the learning curve by making information more easily available.

### Collaboration

Increasingly, mobile devices and wearable devices are pushing the boundaries of the way that people interact. Just the simple act of texting opened up a different type of interaction, but it's long been understood that remote collaboration is weakened by things like an inability to see body language or to see what your collaborator sees.

More and more, technology is trying to bridge those gaps. Telepresence devices, such as the Kubi device created by Revolve Robotics are trying to enable a more immersive telepresence experience. The Kubi is fairly straightforward device: it's basically an iPad on a controllable stand that swivels, and using video call technology, it's intended to replicate the experience of being physically present in a meeting. The swivelling stand allows one to "turn" to look at people in different parts of the meeting room. But I'd argue that these types of devices feel weird to the average user, partially because the way a user interacts with them is techy and unnatural.

That's where wearable devices improve the overall experience. For example, PLT Labs has a wearable device — the Wearable Concept 2 — that makes the interface more natural. I can, for example, drive the rotation of the telepresence camera with my head motions. If I want to turn the telepresence device's "head" (and, hence, camera) to see the other end of a conference room, I simply turn my head, and the device tracks my action.

While remote collaboration is generally helpful for enterprises, there are some special cases, such as telehealth, where improved technology and ubiquitous availability can provide significant effectivity improvements.

And there are strong indications that Virtual Reality can turn in to a powerful collaboration tool. That's an assertion that still needs to be proven, but the promise seems powerful.

## Productivity

Consider the following simple example: you're standing in the cashier's line at the grocery store and ahead of you, someone has placed an item on the conveyor belt that doesn't scan. Often, the cashier has to request a priced check. Usually, this happens over the store's intercom: "Price check to number three!" Then they have to wait for the price check runner to show up, to be shown the item that needs the price check. Then everyone waits for the runner to return with the price.

If the cashier could send a picture — perhaps taken with a smartglass — directly to the runner, then you can eliminate one trip to the cashier. If the runner can transmit the price back to the cashier, there's the second trip eliminated. And the faster this takes place, the faster the cashier's line gets going again.



Now maybe that example is too trivial to pass a return-on-investment test; after all, most grocery stores have this interruption down to only a few minutes.

But there are some cases where cost of a work stoppage is very high. Consider a work stoppage on an auto assembly line. Every minute the assembly line is stopped is fantastically expensive — some estimates place the cost around \$22,000 per minute or as high as \$50,000 per minute. Remote inspection of a failed part, or even remote approval of a return to service can cut down on the amount of time a line is down. And if a part does need repair, immediate access to service procedures can reduce the time that the line is out of service.



Offshore oil rigs are another example where every minute of work stoppage is incredibly expensive.

In a more modest example, Tom Emrich of We Are Wearables also makes this argument about smartwatches and actionable notifications: I can accept a meeting invite on my smartphone, but I probably have to get my phone out of my pocket and perhaps launch my email or calendar before I can accept the meeting request.<sup>6</sup> On my smartwatch, once the notification comes in, it shows up as soon as I turn my arm, and I can immediately accept or reject the request. That's a slightly faster interaction. What's more important, Emrich says, is that I'm not tempted to then check the rest of my mail because my phone's already open anyway. The smartwatch keeps me focussed on the task at hand, and minimizes disruption to my current activities. Again, these seem like extremely minor productivity improvements, but in a large-sized enterprise, they build up.

In fact, there are some indications that this is a specific design point of the Apple Watch: in an interview in *Wired*, Apple VP Kevin Lynch said:

**Our phones have become invasive. But what if you could engineer a reverse state of being? What if you could make a device that you wouldn't—couldn't—use for hours at a time? What if you could create a device that could filter out all the bullshit [BS] and instead only serve you truly important information? You could change modern life.<sup>7</sup>**



<sup>6</sup>We Are Wearables 2014 Conference.

<sup>7</sup>iPhone Killer: The Secret History of the Apple Watch. <http://www.wired.com/2015/04/the-apple-watch/>

In a *Wall Street Journal* review of the Apple Watch, Geoffrey Fowler latched on to this idea as well: “The measure of smartwatches’ success shouldn’t be how well they suck you in, but how efficiently they help you get things done.”<sup>8</sup>

Time will tell whether or not smartwatches (and other wearable devices) live up this promise of efficiency, but this is a selling point that many commentators are circling around.

Let’s return to our earlier example of the grocery-store line-up: that example involves the hand-off of work from one employee to another in human time. Applications that manage these kinds of hand-offs are referred to as workflow systems, and they appear — in both simple and complex forms — in a large number of business domains. Simple forms can be anything from manager approval of expenses or time sheets; more complex cases can include filling pharmacy orders or managing all the interactions necessary for processing an insurance claim.

Wearable workflow feels like an ideal productivity benefit for basic flows. If I can deal with incoming requests with a glance and a tap, I can close out work items faster. Today, most workflow systems are implemented using email, but in most cases, email is being used as a notification system (“something requires my attention”) rather than a system that manages the workflow activities. More often than not, the process looks like this: click on a link in an email, then don’t forget to sign-in to the workflow web app, and then click on something again to confirm that you meant to do that activity. It’s a terrible design-point, but is implemented in an “appeal to the lowest common technology denominator” kind of way.

A wearable device such as a smartwatch, on the other hand, is an ideal interface to the workflow system: it supports instantaneous notification, but also allows a user to immediately take basic actions. What’s more, Tom Emrich’s insight about maintaining focus is key: email as a notification system just begs for someone to shift gears and start reading other emails, perhaps getting mired in lengthy email chains.<sup>9</sup> A wearable workflow system allows one to act on the thing that needs action, and then get on with life.

And, more generally, we’ll reiterate that there’s an obvious productivity benefit for workers who work with their hands. Wearable devices that allow a user to avoid freeing up a hand to engage an app makes information more immediately available. Examples:

- construction workers don’t need to leave a location (or take a device out of a pocket) to look up blueprints;
- surgeons can have patient vitals displayed on a heads-up display interface, and don’t have to touch anything or even look up from a surgical procedure to check a patient’s vitals;
- people who work in clean-room environments (or even food service workers) can interact with wearable technology without having to undo and redo their clean-room protocols; and
- drivers can interact with technology for directions or to accept taxi pickup requests without having to take their hands off of a steering wheel.

## Security

Identity continues to be one of the major value propositions for wearable devices. Smart devices, including watches and mobile phones, can easily play a role in two-factor authentication, but Apple and other smartwatch manufacturers are rumoured to be working to situate smartwatches as a replacement for key fobs and even car keys. Hotels are looking to support smartwatches in place of magnetic room keys.

And that doesn’t even start to address the extra security benefits of specialized sensors such as the Apple Touch ID-based authentication or Nymi’s heart-rhythm-based identification.



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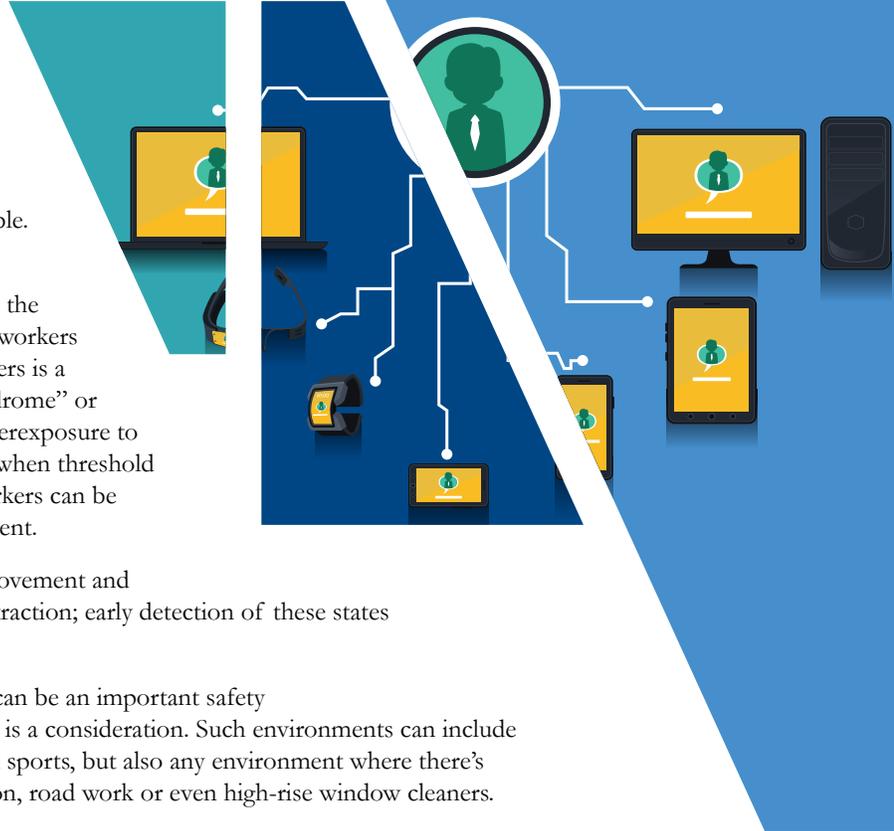
<sup>8</sup> Apple Watch Review: The Smartwatch Finally Makes Sense. Geoffrey Fowler. Apr. 8, 2015. <http://www.wsj.com/articles/apple-watch-review-the-smartwatch-finally-makes-sense-1428494495>

<sup>9</sup> We Are Wearables 2014 Conference.

## Personal and Industrial Safety

Because of the embedded sensors in wearable devices, a number of personal and industrial safety uses are applicable. Some examples:

- An early type of custom wearable was piloted in the UK with construction workers. One danger for workers who use vibrating equipment such as jackhammers is a condition known as “Hand-Arm Vibration Syndrome” or “Vibration White Finger” which is caused by overexposure to vibration. A custom wearable device can detect when threshold of vibration exposure has been reached and workers can be notified that they need to stop using the equipment.
- Smartglasses that include sensors to track eye movement and behaviour can be used to detect tiredness or distraction; early detection of these states can increase driver safety.
- Wearables that keep track of a user’s vital signs can be an important safety device in any environment where physical safety is a consideration. Such environments can include physically demanding work, such as professional sports, but also any environment where there’s physical risk for the workers, such as construction, road work or even high-rise window cleaners.



## Consumer Value Proposition

In addition to the enterprise value, Apple has already started to make their case for the consumer benefits of the Apple Watch. In their March 9th, 2015, media event, Apple showed off expected features such as easy notification integration (including actionable notifications), integrated health sensors and touch-based collaboration abilities.

One of the most interesting parts of their demo included their integration with hotel door locks at hotel chains such as W Hotels, Starwood Hotels, and Aloft Hotels. This kind of feature obviously paves the way for wearables taking the role security key fobs, car keys and perhaps even house keys. Arguably, this isn’t a feature that’s unique to the watch; one can accomplish the same thing using a mobile phone. But the convenience of having the watch always on the wrist improves the experience.

Similarly, it’s currently possible to show one’s airline boarding pass on a mobile phone, but holding the phone in addition to a passport, luggage and other personal items can sometimes make that experience awkward. The watch is always available, and a bar code can be presented with a simple move of the wrist.

## Making the Most of Features

Let’s take a closer look at the main four wearable features, one at a time.

### Hands-Free Work

One of the earliest hands-free wearable device is also one of the least interesting: bluetooth phone earpieces. Because they offer so little additional functionality, they’re hardly worth considering.

When we talk about hands-free wearable devices, smartglasses are clearly the main category. And it’s tempting to view the recent changes to Google’s Glass strategy as an indication that Glass (and smartglasses more generally) are a dead industry. Tom Emrich<sup>10</sup> on the other hand, argues that what we’re seeing is a pivot away from smartglasses from being a consumer-oriented device to being an enterprise-oriented device.

In the enterprise, certain industries can realize much clearer value from hands-free devices and smartglasses. In 2013, Gartner argued that the field service industry could realize one billion dollars in savings a year by 2017.<sup>11</sup> Gartner argued that industries such as manufacturing and oil and gas would realize the greatest benefit, but that moderate benefit could be realized in retail, consumer packaged goods and healthcare. Even insurance and banking could benefit, although the savings in those industries would be less.

<sup>10</sup> We Are Wearables 2014 Conference.

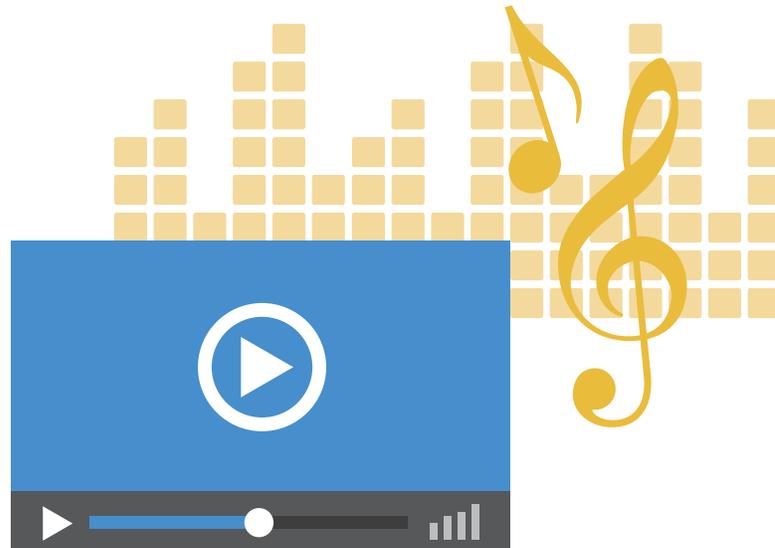
<sup>11</sup> Gartner Says Smartglasses Will Bring Innovation to Workplace Efficiency. Nov. 6, 2013 <http://www.gartner.com/newsroom/id/2618415>

It's also worth noting that there are other hands-free wearable devices in addition to smartglasses. One example relates to gesture recognition devices such as the Myo gesture control armband by Thalmic Labs. Another example is the neurofeedback-based control systems created by Personal Neuro Devices.

## Video and/or Audio Capture and Streaming

Numerous industries can benefit from easy video capture:

- a claims inspector for an insurance company can record damage to a car or building;
- couriers can record package delivery to prove completion of a job; and
- and easy and ubiquitous availability of video recording can prove beneficial for any organization that needs to consider a need for litigation and video evidence.



Video streaming is already providing new opportunities for sport, entertainment and media. Sports reporting is offering the “player’s-eye view” of events using wearable cameras.

In the wake of incidents like Ferguson, the public demand for law enforcement to wear cameras to record interactions with citizens is growing. For their part, law enforcement is experimenting with smartglass-based solutions to augment policing. For example, Recon Instruments, a Vancouver-based company, is working with an offering called the “Connected Police Officer Solution,” which provides heads-up display notifications and alerts that can be presented to officers without requiring them to turn attention away from the scene.

More than that, some law enforcement agencies are experimenting with smartglass solutions that perform real-time facial recognition of people they interact with which, when coupled with the power of heads-up display, can give police extra data about a person, including outstanding warrants and/or past criminal records.

Another area where facial recognition might prove valuable relates to hospitality or working with high-end clients. Technology that assists workers to recognize important clients, and offer them more personalized experience can help encourage loyalty and good reviews. Some airlines have stewards use iPads to service their first-class passengers, but by switching to smartglass solutions, they increase the amount of eye contact with the passenger, which leads to a perception of better service.

In a different example, hospital surgeries are working with similar recognition algorithms that allow smartglasses to recognize surgical instruments and allow a heads-up display to superimpose the names of the instruments on the field of vision to provide extra confirmation to surgical nurses about which is the right instrument to hand the surgeon.

## Virtual Reality

It's tempting to think of virtual reality as limited to the gaming world, but it also has a large role to play in education and training, not to mention collaboration.

I've previously mentioned how the military is using Virtual Reality for training simulations for soldiers. What's more the immersiveness of VR is increasing. It's not just about what you can see; Subpac, for example, works with tactile sound. It's one thing for a soldier to see the enemy approaching; it's another to feel the enemy creeping up behind you.

Having said that, however, VR has had an immensely slow evolution cycle (the Motley Fool says that “Virtual reality has been the next big thing that never really happened for over 20 years.”<sup>12</sup>) VR tech was supposed to radically transform the world in the 90s, but it's only since the Oculus Rift that the technology really seems viable. Other headsets like the HTC Vive make a similar promise. But cheap, entry-level options such as Google Cardboard (which allows one to use the combination of smartphone and a simple cardboard holder/headset to enjoy a VR experience) are going to be many people's gateway to this technology.



<sup>12</sup> Is Virtual Reality the Next Big Thing? The Motley Fool. Daniel Kline. Apr. 14, 2014. <http://www.fool.com/investing/general/2014/04/14/is-virtual-reality-the-next-big-thing.aspx>



## Privacy

In almost every conversation about wearable devices, someone raises the topic of privacy. Wearables are frequently touted as the most intimate technological device one will use. They're always available, packed with sensors and transmitting boatloads of data.

The combination of mobile devices and advanced sensors are, together, causing dramatic evolutions in the nature of privacy. High-profile privacy breaches — such as when credit card data, passwords, or intimate photos or other data are compromised — create justified outrage that private data has not been properly protected. On the other hand, social media sites like Facebook, Google+ and LinkedIn are clearly mining data from each other to tell the world our birthdays and where we went to school. This data mining hasn't seemed to alarm most users of the sites; if anything, most users seem to accept that surrendering a bit of data is the cost of using such services.

There are, however, a number of use-cases that one can bear thinking about, especially as enterprises embrace wearable technology. Consider the following examples:

- We've already discussed the ability of wearable devices to employ safety-related sensors, such as sensors for detecting the tiredness or distractedness of, for example, drivers. How long will it be before similar sensors can detect illegal drug use?
- If motion sensors can detect early signs of Parkinsons and other medical conditions, under what circumstances is it appropriate for the devices to notify an employer about these conditions? Under what circumstances is it appropriate for the devices to notify the corporate health insurance provider?
- If your employer provides you with a wearable device, is it valid for the wearable devices to be pre-loaded with apps that notice location data that might suggest that an employee is interviewing with a competitor?

Recently, there have been some high-profile incidents of smart product makers trying too hard to push the envelope on privacy. For example, Samsung recently warned its customers that its Smart TV is constantly listening to conversation and that those customers shouldn't discuss personal information in front of the TV. While many analysts argue that the concern is overblown, it's clearly true that the incident resulted in bad press, customer apprehension and loss of consumer trust.

My point here is that, while most users' ideas about privacy and what data they're willing to surrender are evolving, it's very easy to make a misstep, here. Transparency about what data is being collected, and why, is probably the best path to negotiating this ever-shifting landscape.



## Conclusions

2015 will be the year that wearables take off. Much of the excitement around wearables will be directly tied to the launch of the Apple Watch, but this will also be the year that enterprises recognize the business opportunity of wearables. Here are some calls to action that enterprises should consider in 2015:

1. Consider if and how Apple Watch might supplement your organization's current mobile offerings;
2. Consider the use of wearable devices to aid internal or customer-facing processes;
3. Be up-front about data collection and conscious of potential privacy concerns; and
4. Recognize that the next two years will see a lot of churn in the wearable space; don't wait for the space to settle but, instead, charter early wearable pilots with the knowledge that some initial investment might be throwaway.

## About the Author



### **BC Holmes, Chief Technologist**

BC Holmes has 20+ years' experience designing and building applications. She has successfully delivered dozens of software projects as technical lead/solution architect and led the team that built the first online web banking system in Canada (for Desjardins). Most recently, she has been specializing in mobile banking and e-health applications.

She holds a joint honours degree in Pure Mathematics and Theatre Arts from the University of Waterloo.

## About Intelliware Development Inc.

Intelliware is a custom software, mobile solutions and product development company headquartered in Toronto, Canada. Intelliware is a leader in Agile software development practices which ensure the delivery of timely, high quality solutions for clients. Intelliware is engaged as a technical partner by a wide range of national and global organizations in sectors that span Financial Services, Healthcare, ICT, Retail, Manufacturing, and Government.

Intelliware placed among the Top 5 Mobile Technologies Companies in the 2012 Branham300 report, the definitive listing of Canada's Information and Communication Technology (ICT) industry leaders, as ranked by revenues.

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