MIS QUARTERLY EXECUTIVE

APC Forum: Extending Business Values through Wearables

Karen Robson
University of Central Michigan (U.S.)

Leyland F Pitt
Simon Fraser University (Canada)

Jan Kietzmann
Simon Fraser University (Canada)

Executive Summary

When physical objects are connected to the Internet, they can identify themselves to other devices and exchange data automatically and seamlessly. When people adopt emerging wearable devices that are connected to the Internet, opportunities are created for organizations and individuals that can surpass the impact of even the most significant technologies of the Industrial Revolution and its aftermath. We term this convergence of connected people and devices the Internet of Everything (IoE). For example, firms can eliminate residual operational risks through new types of data flows and can overcome performance bottlenecks by extending naturally degrading organizational capacities through wearable technology. By equipping workers with such technology, firms can elevate competencies and capabilities beyond what is currently possible and can improve organizational performance.

In this report we present three decision frameworks that IS executives can use to explore opportunities for leveraging wearables in their organizations. These frameworks integrate connected devices and people into the Internet of Everything.

Introduction

The Internet began as a global system of interconnected mainframe and personal computer networks using the Internet protocol suite (TCP/IP) to link components. Personal computers were soon joined by powerful laptops. More recently the Internet burgeoned to billions of connections worldwide through linkages to wireless-enabled tablet computers and Internet-capable smartphones. Now the Internet is again poised to grow exponentially as hundreds of different devices not traditionally regarded as computers, such as cars, watches, refrigerators, and air conditioners, are connected with the potential to communicate with every other device on the Internet. This vision of the Internet of Things (IoT) includes wearables, devices worn by humans.

To meet the challenges and opportunities of wearables, IS executives need a robust set of decision frameworks to explore their opportunities and applications. Such frameworks are presented in this report, which is organized as follows. First, we define the IoT and illustrate it with examples. Second, we describe wearable technologies, again using examples. Then, we

1 The Society for Information Management's (SIM) Advanced Practices Council (APC) is an exclusive forum for senior IT executives who value directing and applying pragmatic research; exploring emerging IT issues in-depth; and hearing different, global perspectives from colleagues in other industries.

explain the emergence of the Internet of People, as humans wear technologies that become part of the Internet. Although there have been some notable successes to date in the wearables arena, there have also been some prominent bombs. To overcome the likelihood of failures, we propose frameworks that IS executives can use to assess wearable technologies and applications. Two such frameworks, the Source-User (SU) grid and the Purpose-Interaction (PI) matrix are described. We conclude by showing how these two frameworks can be integrated into an idea generation process that enables IS executives to conceptualize wearable technologies and applications into a future in which all devices and all individuals are connected into an Internet of Everything (IoE).

The Internet of Things

The IoT allows everyday physical objects to be connected to the Internet so that they can collect data, identify themselves to other devices, engage in seamless and automatic data exchange, and in some situations be controlled by other devices. Whereas the original Internet was essentially about computers (and obviously the humans behind them) communicating and exchanging data, the IoT is about connectivity among a host of everyday objects such as cars, household appliances, and even whole cities embedded with chips, software, sensors, and network connectivity.

We are familiar with such physical objects as smartphones, tablets, and other computing devices that connect to the Internet to identify themselves and engage in data exchange with other devices. However, the IoT extends beyond portable electronic devices to include such things as vehicles and home monitoring systems.

Wearable Technologies

Wearable technologies ("wearables") refer to the technological enhancement of products that can be worn on almost any part of the anatomy (e.g., watches, glasses, shoes), as illustrated in Table 1. Although people have been wearing technology for centuries (for example, the first wristwatch was made for the queen of Naples in 1810), wearables in the current context refer to devices that contain a computer chip as well as computing and communication power. The first wearable computing device was the Gambling Shoe, created by students from MIT in 1961. This electronic piece, worn strapped around the waist, responded to the taps of a shoe. It applied mathematical theories to attempt to beat the roulette wheel in casinos. Today there are many hundreds of wearable devices that can monitor, control, optimize, and even autonomize a wide range of functions and behaviors.

Wearables are the most personal computing devices of all – far more so than personal computers. Depending on which part of the human anatomy a wearable is worn, the device will obviously be visible (e.g. glasses, wristband) or not (torso band, socks). This means that fashion and design appeal will really matter for some devices. For example, Google Glass was heavily criticized because many thought it geeky

IoT Examples

The electric vehicle manufacturer Tesla makes the whole car part of the IoT. In addition to performing the typical functions of a vehicle, a Tesla car is constantly connected to the Internet. The vehicle's software automatically downloads and installs updates, and autonomously schedules a valet to pick the vehicle up when physical maintenance is needed.

Live!y is a smart monitoring and alert system for older adults. This system includes activity sensors that can be placed on household objects – for example, on a refrigerator, or on a medication package – which then monitors the environment and alerts other family members if anything unusual occurs, such as an elderly relative skipping a meal or not taking scheduled medication.

As part of a Father's Day campaign in 2013, Johnnie Walker Whiskey in Brazil connected 100,000 whiskey bottles to the Internet. Each of these bottles was given a unique QR code which, when scanned, allowed people to create, watch, or share a video tribute. As a result, buyers could create personalized film tributes linked to a specific bottle that they could send as a gift to their fathers.

Table 1: Where is the technology worn?

Anatomy	Device Examples	Application Examples
Head	Cap, eyes, glasses, ears	Monitor fatigue; portable computer
Neck	Necklace, chain, tie	Smartphone control, camera
Torso	Shirt, jacket, band	Monitor health, posture
Waist	Belt, fob	Monitor activity, identification and location
Upper arm	Band	Monitor activity, enhance lifting strength
Lower arm/wrist	Band, watch	Monitor fitness activity, interact with smartphone, portable computer
Hand	Ring, glove	Unlock doors, connect people, interact with touch screens in winter, SIRI/Cortana/Google Now enabled
Upper thigh	Band, pants	"Smart jeans" enable smartphone interaction, enhance physical strength
Lower leg	Socks, band	Pressure sensors monitor foot injury, posture
Foot	Sock, shoe	Navigation, fitness

Wearable Technology Examples

Some of the most well-known wearable technologies include wrist-worn devices such as the Fitbit and Apple Watch as well as Google Glass. Additional highly creative and unique wearables are on the market or in development. These range from a urine-powered energy generator worn on the feet to jewelry that alerts wearers to potential over-exposure to UV rays in order to protect against sunburn.

Disney has recently ventured into the use of wearable technology with its Disney Magicband. This $1 billion investment is a sensor-laden wristband that vacationers use to check into their hotel rooms, pay for food, and reserve a spot for various attractions. The Magicband tracks the movements of the wearer through RFID, allowing Disney to collect data on visitor movements.

Working with Deeplocal, the online movie streaming service Netflix is developing socks that sense whether a wearer is awake or asleep. These socks address a common problem for Netflix customers, falling asleep while streaming Netflix videos. These socks pause videos when they detect that a subscriber is sleeping, allowing the wearer to wake up and pick up the program right where it left off.

The Lumo helps correct bad posture. It is a small sensor that clips onto a wearer's shirt, undershirt, bra, or jacket. The Lumo senses the posture of the wearer and sends data to an app whenever he begins to slouch. Lumo is designed to coach wearers into adopting a better posture by alerting them whenever their stance puts them at risk for back pain.

The Lechal Smart Shoe uses haptic or vibratory feedback to guide wearers, allowing them to navigate intuitively and hands-free. Designed for individuals who are visually impaired or those operating in the dark, the shoes give off vibrations like a tap on a shoulder.

or nerdy, while the Apple Watch is generally praised for its design and style. The security of wearables is arguably more critical than for any other computing device. Not only might personal data be at stake, but it is possible that malevolent hacking could lead to the physical injury of the wearer. Many wearables are also very fashionable and therefore expensive. For example, the Brikk's Lux Watch Omni costs $114,995. It is an 18-karat gold Apple Watch with multiple rows of 11.30 carat diamonds around the face, buttons, and strap clasps. Given the price, theft is a serious factor.

There is little doubt that wearable technologies will represent a huge future market. By the end of 2014 for example, 6% of the UK population (roughly 2.8 million people) had some form of wearable device and that number was set to more than double to 6.1 million (13% of the population) during 2015. Wearables have experienced triple-digit Amazon.com sales increases year-over-year. The consulting firm IDTechEx predicts that the wearables market will grow from $20 billion in 2015 to almost $70 billion in 2025.

There have been some notable successes. Apple has shipped nearly 7 million smart watches since launch, a figure in excess of all other vendors' combined shipments over the previous five quarters. But despite much hype, adoption by celebrities, and support from fashion icon Diane von Furstenberg, Google announced on January 15th 2015 that it would stop producing and marketing Google Glass.

In the belief that executives can learn from failures as well as success stories, we interviewed a senior executive in a major technology company who participated in the development team of a failed wearable device. We were interested primarily in how the idea had originated, how the development process had progressed, why the wearable had failed to meet expectations, and what lessons had been learned. The company and the individual agreed to our investigation on condition of strict anonymity. The learning points provided in the short vignette in the Appendix provide valuable insights on the development of wearable technology.

The Internet of People

The IoT is a vision of ubiquitous connectivity driven by one basic idea: screens are not the only gateway to the ultimate network of networks. Some might regard wearables, such as glasses and watches, as just more screens through which to access the Internet. But wearables also gather information by monitoring and sensing temperature, blood pressure, physiological data such as blood sugar levels and perspiration content, and communicate through pulses, signals, and haptic feedback. Wearables such as

IoP Examples

Some wearable devices track the location and movements of wearers. The Safelet is a smart bracelet that allows non-wearers to track the movements of the wearer on a smartphone app. This device is intended for parents who want to keep track of their children or adults who are concerned for their own safety and wish to have an easy way to alert others to the fact that they may be in danger. Using this wearable device allows the movements of the wearer to be tracked – thus, they become part of the IoP.

Air New Zealand realized parents and guardians wanted to follow the progress of their unaccompanied minors who were travelling on Air New Zealand. To solve this problem, the airline created NFC-enabled wristbands that could be scanned at various checkpoints throughout an airport. Using this relatively simple technology, Air New Zealand created a solution to a very common problem. Data from the wristbands – including check-in, boarding, landing, and hand-overs – are automatically sent to up to five parents, guardians, or others who want to follow the status of the unaccompanied minor.

The SmartCap is a hat worn by long-haul truck drivers. It senses the movements of the wearer's head and eyes, and also tracks the amount of time a person has been at the wheel of a vehicle. The SmartCap determines if a driver is getting fatigued and alerts managers, who then call the driver to tell him to take a break. Here again, the wearer of the SmartCap has information transmitted to another individual remotely, allowing that manager to remind the driver to take breaks and sleep as needed.

armbands and muscle enhancers, torso bands, belts, thigh bands, socks and shoes, along with glasses, watches, and contact lenses will not only be part of the IoT, they will make people part of the IoT and, in doing so, create the Internet of People (IoP).

When people use wearable technologies that truly become part of them, these devices enable them to not only become more conscious of their environment and events happening around them but also to become less or even unconscious of them. Instead of working with devices, people work through them, ideally focusing on the things that matter. We refer to this phenomenon of people and their interaction with all their wearables as the IoP. A number of excellent examples of the IoP are already beginning to emerge.

Frameworks for Exploring Wearables and their Applications

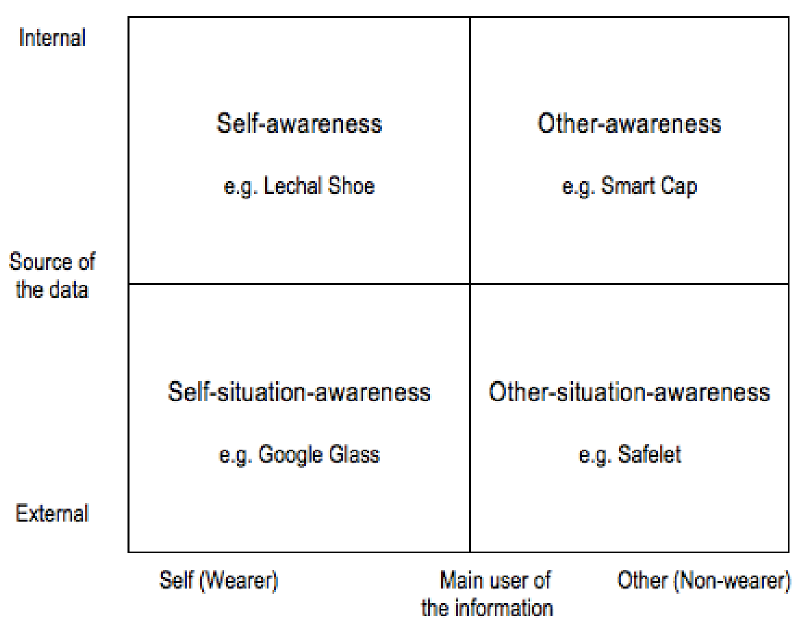
The first two decision frameworks that IS executives can use to explore opportunities for leveraging wearables are the Source-User (SU) grid and the Purpose-Interaction (PI) matrix. The SU grid can help executives understand the information flows of the device – specifically, it conceptualizes alternatives in who uses the data generated by the wearable device and how the wearable device generates the data. The PI matrix can help executives understand the different purposes for a wearable device in terms of the human experience of wearing it as well as whether the device is intended to interact with the wearer only or with other devices or people.

The Source-User (SU) Grid

The SU grid asks two simple but fundamental questions about a wearable technology and its applications. First, who will be the main consumer of the information from the device? Will it be the wearer of the device or someone else? Second, from where will the data come? Will the source be internal, that is, from the wearer (a pulse, movement, tears or perspiration) or will it be external, that is, from the environment in which the wearer finds herself (the ambient temperature or location)? These questions are illustrated in the two dimensions of the grid shown in Figure 1.

These questions focus on people and problems rather than technologies and software. The Air New Zealand team began with a problem: "We fly a large number of kids without their parents or guardians, and a 'pain point' for parents or guardians is that they can't track these kids

Figure 1: The SU (Source-User) Grid



over the various phases of their journey." After acquiring the tracking bracelets and the basic software from a vendor, they interfaced them with Air New Zealand's own systems, most of which were already in place (the airline was already using text messages to update frequent flyers on information such as flight delays, gate changes, and boarding times).

Each of the four cells in the SU grid focuses on a different wearer-data source situation. In the lower-left cell, the *self-situation-awareness quadrant*, the main user of the information that the device communicates is the wearer and the data generated is from the external environment. Google Glass is a good example of this: wearers can access the Internet using Glass and can conceivably get any information that that they could access on a smartphone or laptop while moving without a need to carry anything. In the lower-right cell of the grid, the *other-situation-awareness quadrant*, the wearer is not the main consumer of the data and the source of the data is not from the wearer himself but rather from the context in which he finds himself. For example, the Safelet gathers exact data about its (and by definition the wearer's) geographic positioning and transmits this information to someone else who needs to know about the wearer's location. This application would be useful to parents or guardians of small children they want to monitor closely.

In the cell in the top-left of the grid, the *self-awareness quadrant*, the wearer is both the source and user of data. The Lechal Shoe follows and exactly measures the wearer's movements and distances and, combined with a GPS locator, uses the data to guide the wearer by prompting movements and changes in direction through a series of vibrations in different parts of the shoe and its sole. In the cell in the top-right of the grid, the *other-awareness quadrant*, the wearer is the source of the data, but not the user. An example is the SmartCap. The cap, worn by long-distance truck drivers, monitors their sleep and rest patterns. The information is monitored at the trucking firm's headquarters and a driver can immediately be alerted to take a mandatory break when the cap detects that the driver needs to sleep.

The Purpose-Interaction (PI) Matrix

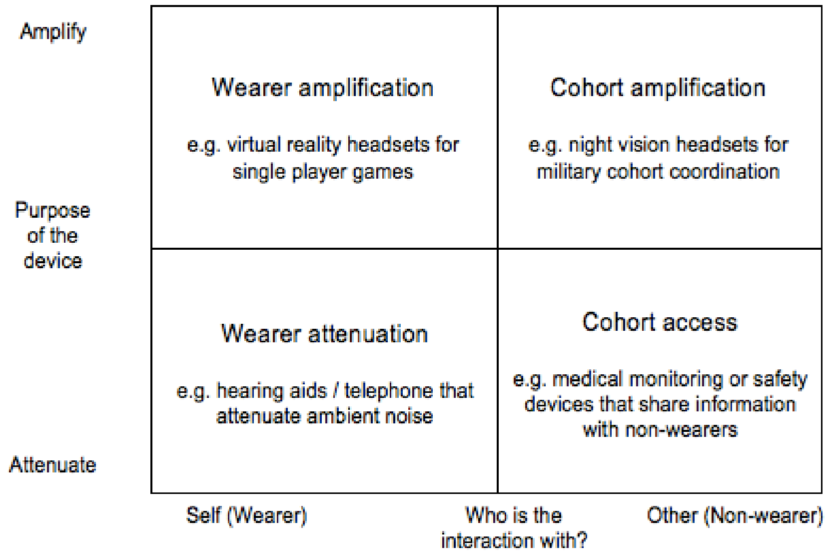
The PI matrix illustrated in Figure 2 has two dimensions. Networked wearable technologies can either amplify or attenuate consciousness. Amplification means that an individual's ordinary awareness can be extended or enhanced, even to the point of ultraconsciousness. Attenuation means that a wearable technology can take something that once occupied a person's conscious awareness and drop it well below this level by performing a task automatically, thereby rendering it an unconscious process. So the two poles of the first dimension are amplification and attenuation. The second dimension asks whether the wearable device interacts only with the wearer or with others.

In the lower-left cell, the *wearer-attenuation quadrant*, the emphasis is on devices that attenuate information so the wearer does not receive unwanted signals. For example, a diabetic wearing contact lenses that monitor blood glucose levels contained in human tears does not wish to be bombarded with continuous messages when measures are within a satisfactory range. However, when the glucose level moves out of acceptable range, the individual wants to be notified immediately.

In the top-left cell, the *wearer-amplification quadrant*, the device interacts with the wearer by amplifying information. An example is a player wearing a headset in a virtual reality game. Players want to interact with the game in a way that lets them escape from reality and immerse themselves completely.

In the top-right cell, the *cohort-amplification quadrant*, external information is amplified by the device, but not for the benefit of the wearer. An example would be night vision headsets that allow police or military people to view what others are viewing and to communicate at the same time. The external information they share could be real, that is from the geography or terrain, or virtual, such as the sharing of data from a database, viewing a GPS map, or watching video. In the lower-right cell, the *cohort-access quadrant*, the device attenuates signals for the wearer and interacts with a cohort of others, not the wearer. *Airstrip* is an integrated fetal monitoring app that allows fetal heart data to be gathered through a comfortable band worn by a pregnant woman. Data are not only transmitted

Figure 2: The PI (Purpose-Interaction) Matrix



wirelessly to the mother's Apple Watch (so she can turn it off if she wishes), but are sent to her physician. Only when data move beyond critical bounds will the physician contact the woman and schedule treatment.

The 5-E Framework

Combining the insights from the PI matrix with those from the SU grid yields a useful framework for further conceptualizing potential opportunities for leveraging wearable technologies. The 5E Framework, shown in Figure 3, can help those interested in developing and those considering deploying wearable technologies. For the former, it presents categories for generating, developing, and communicating ideas for new wearable inventions. For the latter, it presents a way to investigate organizational data flow problems and to find appropriate existing wearable solutions.

The 5-E Framework essentially combines the source of the information with the purpose of the device. The resulting quadrants (eliminate, extend, elevate, and enrich and expand) describe different types of organizational problems and introduce opportunities for wearable solutions to be deployed or developed.

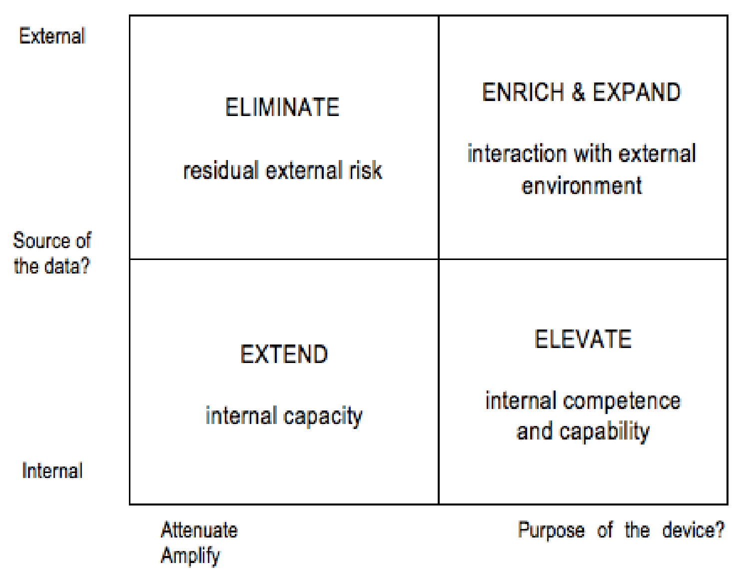
Eliminate - This first type of data flow problem originates from external risks, primarily those that are not addressable with current technologies. For instance, although bicycle helmets reduce the impact of an accident for the rider and highly reflective clothing lowers the probability of accident in the first place, accidents still occur. Volvo, known for developing the modern car seat belt and being the first car manufacturer to introduce it as standard equipment, treated this risk as a data flow problem (i.e., drivers don't know when riders are nearby) and developed a wearable device in response. With the intention of eliminating blind spot accidents, its smart helmet alerts riders and drivers to each other by uploading both cyclists' and drivers' locations to Volvo's cloud. The helmet functions like any other helmet and the rider is unaware of the smart technology except when alerted of a potential danger. Firms operating in dangerous external environments (e.g., first responders) were quick to consider wearable devices for eliminating such residual risks. However, threats don't have to be life threatening for wearables to offer compelling propositions for *eliminating* external hazards – many other residual risks might be eliminated or at least mitigated further through wearable technologies.

Extend - In some cases, the risk originates with the wearer rather than an external source. Our physical and cognitive performance is limited by our anatomy and physiology. Whether based on chronic conditions (e.g., diabetes) or induced by extended bodily or mental work, we sometimes operate at suboptimal levels. We naturally tire, lose focus, or suffer from dangerously high or low blood sugar levels. Wearable technologies promise to enable us to perform near optimal levels for longer. They *extend* the time during which we can remain productive and healthy individuals and employees. Residing in the background, these technologies attenuate and imperceptibly monitor performance until performance degrades and an intervention is required. Consider the SmartCap that monitors the tiredness of a driver or the contact lens that checks the insulin in the tears of its wearer. These wearables do not actually improve the capabilities or competences of the wearer, but extend their capacity to operate at acceptable performance levels. We don't become superhuman, but we can function at our normal levels for longer. Such applications are particularly interesting when extended performance reduces the negative impacts on the wearer or on others, or where such extensions carry promising efficiency returns.

Elevate - Wearables that operate in the ultra-conscious, on the other hand, don't simply prolong natural performance. By amplifying the wearer's ordinary awareness, they can actually *elevate* our competences (knowledge) and capabilities (processes to apply or exploit these individual competences). Exoskeletons, which borrow their name from the external protection found on animals' bodies (e.g., on grasshoppers or lobsters), collect data from the wearer and elevate skills, strength, and endurance beyond their natural capabilities. Using systems of motors, pneumatics, levers or hydraulics, a powered glove allows surgeons to operate with higher precision. Robotic suits give manual laborers super strength so that they can effortlessly carry heavy parts tirelessly.

Enrich & Expand - The fourth type of wearable technology connects the wearer with the external environment while at the same time amplifying her ordinary awareness. Much like the first type (eliminate) of this framework, applications in this quadrant represent data flow opportunities and problems. Augmented reality (AR) wearables *enrich* experiences by overlaying digital information onto the physical world via an electronic device. As discussed previously, Google Glass remains possibly the best-known attempt at enriching everyday lives, but many others are emerging. Because AR, unlike virtual reality, still allows people to remain in the real world, AR has more immediate practical applications for business. For instance, Optech4D is a set of glasses for maintenance workers. It recognizes a piece of equipment, retrieves its service history on the screen, and displays the relevant

Figure 3: The 5-E Framework



maintenance procedures. Holograms are used for teaching and training purposes, and surgeons use a heads-up display combined with an ultrasound wand to "look under the skin" of the patient without having to turn to a monitor.

In other cases, wearables can use *external* data to expand experiences. For instance, belts and ankle bracelets (similar in appearance to homing devices that individuals under house arrest or parole are often required to wear) are available that signal which direction is north through subtle pulse sensations. These wearable compasses, which expand our senses and allow us a true feeling of absolute direction, found immediate applicability in military contexts, but were soon related to other applications. In large warehouse operations, such wearables can guide workers to the next items to be collected and give them the best route to get there. The collected data can then be used for warehouse layout optimization.

Conclusions

The Internet continues to evolve from a collection of static HTML pages that could be accessed from desktop computers to a computing environment that truly drives anytime, anywhere data collection and access opportunities. This of course is propelled by the increasing miniaturization and connectedness of computers. We are now at the cusp of what Weiser projected 25 years ago in his prediction for the computer for the 21st century: the disappearance of the computer. When information and communication devices weave themselves into the fabric of everyday lives, they seemingly fade away from our consciousness. Rather than working knowingly with these devices (e.g., by going to an office and starting up a device), we can now take them for granted and work through them, unconsciously. Wearables now offer even more opportunities for computers to become highly embedded – and when we think through how they can combine different sources of information (internal and external), with different levels of engaging their wearers (attenuate or amplify data), we can envision promising new data flow solutions for wearers and other parties to eliminate risks, extend performance levels, elevate competencies and capabilities, and enrich and expand how we live and work.

The Internet of Everything is emerging. Everything and everyone in the world will soon carry and wear sensors, and sensor-based applications will become ubiquitous. Soon we will no longer think about these wearables as standalone smart devices, but as highly connected parts of systems of systems. When this happens, their value will shift further from the wearable device to the information that it provides. In fact, when things and people are increasingly connected, new ways of working and living may follow.

Recommendations

The five Es present a framework for exploring opportunities to leverage wearables. By operating in the background, wearables might be employed and called to the conscious to *eliminate* external residual risks (or at least to reduce their impact and probability further). They can help monitor internal data and alert the wearer or others when performance decreases are sensed in order to improve operational capacity. When wearables do not reside in the unconscious, but rather amplify the wearer's ordinary awareness, they offer altogether different opportunities. When they use internal data, they can *elevate* the performance of the wearer, and amplify their competencies and capabilities beyond what they were normally able to accomplish. By utilizing external data sources, these wearables can also *enrich* and *expand* the experience of the user, either by adding a digital layer to their perception of the world or by introducing entirely new senses. Opportunities and problems in firms today exist in all of these areas. Managers commonly complain about risk management issues (eliminate through wearables), about the declining performance of their employees over time (extend through wearables), about how human skills (elevate through wearables) represent bottlenecks in supply chains and about how data accessibility issues limit organizational performance (enrich or expand such data experiences through wearables). Wearables can help with each one of these scenarios. In fact, given their immense data collection, processing, analysis and networking capabilities, one can think of combinations where wearables solve a host of these issues. They might sit in the background and attenuate some data, while at the same time amplify other data.

Likewise, they can also expose the wearer to some contextual data (in order to solve at hand problems), while showing others collective data to improve organizational efficiencies.

Appendix: The Termination of a Wearable

We conducted an interview with a senior engineer ('Mr. K') at a large, successful IT company with a long history of successes. Mr. K was involved in the development of the product based on his experience developing wearable technology while at university. In our interview, he provided insight into how and why an otherwise successful company created a wearable technology that failed when it went to market.

> ***Q:*** *Where did the idea come from*
> ***Mr. K:*** *Our CEO loves tech and toys, and the idea came from one of our regular brainstorm meetings. We thought we could achieve the initial concept quickly- in six months or so– but we were so wrong.*
>
> ***Q:*** *How did development proceed?*
> ***Mr. K:*** *We modified off-the-shelf products at first, to be roughly similar to what the finished product would do. The team leaders wanted new hardware every month, which was a very aggressive approach, but it also channelled a lot of energy and momentum into the team during the first stages of the project.*
>
> ***Q:*** *How and why did things go wrong?*
> ***Mr. K:*** *The main issue was that the team leadership all had different visions for where the project was going. Perhaps this came about because they all disagreed on who was going to use the technology, and how they would use it.*
>
> *The biggest warning was that very few people on the team wore the device consistently for more than a few days. It was a clear sign that the product wasn't right. When a wearable product is compelling, you have to tell people to take it off.*
>
> ***Q:*** *What are some of the things you personally learned from this project?*
> ***Mr. K:*** *I always ask three questions before any new product: Can my mom use it? Is there a way to present this so it will make her life better? Can she understand how this will make her life better? If a device can't be used or understood by someone who isn't tech savvy, to me that's a bad sign. Also, wearables have to be adaptive. They should be able to adapt to the wearer and their circumstances.*
>
> *I've also thought a lot about how wearables fit with the body. In front of the eyes is the most important real estate on the body – if a message flashes in front of your eyes, it must be both important and timely. This is a contrast to watches - if a message flashes on your wrist, it is less intrusive, so the user tends to be more forgiving.*
>
> *Anything that has to do with apparel means that people will be fashion conscious, and functionality alone won't trump fashion. Of course, it depends where on your body the device is located, but aesthetics is especially important for wearables -- no one wants to look like a dork.*
>
> ***Q:*** *If you were starting up again, what would you do differently as a result?*
> ***Mr. K:*** *I would focus on clarity -- starting with a compelling use case, then making sure you have a clear product vision and product road map. We needed a clear target audience – an answer to the question: "Who are we building this for?" I would want to spend a day in the life of a person who would use this product and find out why do they put it on and not take it off?*
>
> *There was also too much focus on the hardware over the use of the device and the experience of the device.*
>
> *Finally, there was too much pre-launch hype. The product was announced before development was finished, and our*

announcement simply had too much hype. We over-promised.

Authors

Karen Robson

Karen Robson is an Assistant Professor of Marketing at the University of Central Michigan, and is about to defend her P.h.D. dissertation at the Beedie School of Business at Simon Fraser University, Vancouver, Canada. She holds a B.S.c(h) in Psychology from Queens University, an M.A. in Psychology and an M.B.A. from Simon Fraser University. Karen's research investigates consumer innovativeness, including how consumers repurpose or use market offerings in ways not intended by the manufacturer, and the intellectual property law implications of this practice. A recipient of the Joseph-Armand Bombardier Doctoral Scholarship, her work has appeared in journals such as *MIS Quarterly Executive*, *Business Horizons*, *Journal of Marketing Education*, *Journal of Advertising Research*, and *Journal of Public Affairs*.

Leyland F Pitt

Leyland F Pitt P.h.D. is the Dennis Culver EMBA Alumni Chair of Business, Beedie School of Business, Simon Fraser University, Vancouver, Canada, and also Affiliate Professor in Industrial Marketing at the Royal Institute of Technology, Stockholm, Sweden. He has also taught on executive and M.B.A. programs at schools such as the Graham School of Continuing Studies (University of Chicago), Columbia University Graduate School of Business, Rotterdam School of Management, and London Business School. His work has been published in such journals, as *Information Systems Research*, *Journal of the Academy of Marketing Science*, *Sloan Management Review*, *California Management Review*, *Communications of the ACM*, and *MIS Quarterly* (which he also served as Associate Editor).

J
an Kietzmann

Associate professor Jan Kietzmann received his P.h.D. in 2007 from the London School of Economics and joined the Beedie School of Business at SFU in 2008. As a professor of Innovation and Entrepreneurship, Jan's research interests combine organizational and social perspectives related to new and emerging technologies. Jan's current research projects include such phenomena as social media, crowdsourcing, user-generated content, 3D printing, gamification and sharing economies. Jan is perhaps best known for his award-winning 2011 article "Social media? Get serious! Understanding the functional building blocks of social media."

References

Bilton., N. (2015). "Why Google Glass Broke", New York Times, February 4th, downloaded from http://www.nytimes.com/2015/02/05/style/why-google-glass-broke.html?_r=1) on January 12th, 2016

Heidegger M. (1967). What is a Thing? trans. WB Barton Jr. and V. Deutsch. Chicago: Henry Regnery.

Harrop, Peter, James Hayward, Raghu Das and Glyn Holland. Wearable Technology 2015-2025

Judge, J., and Powles, J. (2015). "Forget the internet of things – we need an internet of people", The Guardian, May 25th, downloaded February 18th, 2016, from http://www.theguardian.com/technology/2015/may/25/forget-internet-of-things-people

Lamkin, P. (2015). "Apple Watch Sales Hit 7 Million", Fortune, November 5th, downloaded from http://www.forbes.com/sites/paullamkin/2015/11/05/apple-watch-sales-hit-7-million/#20a5172f5c9a on February 18th, 2016

O'Reilly, Tim and Battelle John (2009). Web Squared: Web 2.0 Five Years On. Retrieved Feb 28 2016 from http://assets.en.oreilly.com/1/event/28/web2009_websquared-whitepaper.pdf

Watson, R.T., Pitt, L.F., Berthon, P.R., and Zinkhan, G.M. (2002) "U-Commerce: Extending The Universe Of Marketing", Journal of the Academy of Marketing Science, 30, 4, 329-343.

Wesier, M. "The Computer for the 21st Century" Retrieved Feb 28, 2016 from https://www.ics.uci.edu/~corps/phaseii/Weiser-Computer21stCentury-SciAm.pdf