Putting Wearable Displays to Work in the Enterprise
Are wearable technologies a consumer fad or a business phenomenon? Thanks to the buzz around Google Glass™, the Pebble™ smartwatch and various fitness tracking devices, consumers have become more aware of the burgeoning technology, with some incorporating wearables into their daily lives.

However, there are much bigger opportunities for deploying wearable technologies. In fact, enterprises have business cases that could save billions of dollars—especially for specific industries and certain types of workers. Accenture Technology Labs believes wearable displays will begin with companies, not consumers—with the first Fortune 500 production deployments starting this fall.

Why? For starters, wearables can boost employee efficiency by providing real-time data access while freeing the hands to hold tools or equipment. Wearable displays can also enable a powerful new level of video collaboration, for example, by connecting field workers with more experienced colleagues, who can then see exactly what the field worker is seeing. And wearables can make it faster and easier for enterprises to make business decisions, compressing the time between intention and action to literally seconds.

Of course, enterprises will need to recognize the trade-offs that come with wearables and develop strategies to address them. Screen real estate is one consideration. Some tasks are better suited for desktops with large screens; others, for wearables with tiny screens that provide instant notifications, contextual information and unmatched portability. In addition, businesses will need to expand wireless networks to ensure Wi-Fi connectivity for remote workers. And they will need to mollify employee privacy concerns about being monitored.

Overall, these are minor obstacles in a major new wave of mobility—wearables are disruptive, transformative and here to stay. To surpass the competition, enterprises should begin now by testing the most promising use cases and determining which type of wearable works best for each situation.
Understand What Wearables Are... and Are Not

One simple way to think about wearables is as smartphones in a different form factor. For our purposes, we define wearables as always-on, connected computing displays that are worn on the body for easy, hands-free access to show contextually relevant information. This functionality makes it possible to support, augment and optimize the workforce, especially for “deskless” employees who need the ability to do hands-free work and access to real-time information. For example, companies could use the camera on a wearable display to see what an employee sees while they perform tasks in the field, and employees could access information from various enterprise systems to do their day-to-day job more quickly and easily. As such, we see wearables as a critical component of the broader industrial Internet trend and advancement of everywhere computing.

More importantly, although smartglasses and wrist displays are a consumer craze right now, enterprises will ultimately rule the adoption wave. Why? It comes down to value proposition. Consumers are fashion conscious, impressionable, price sensitive and admittedly dependent on their tablets and smartphones, which can do many of the things beta-model wearables can do for a fraction of the cost. For these reasons, consumers are much more likely to adopt wearable displays once their price and aesthetic are indistinguishable from prescription lenses, sunglasses or jewelry.

In contrast, the value proposition for enterprises and employees is enormous and much more immediate. Wearables can help improve employee efficiency, enhance training and ongoing communication, reduce nonproductive time and rework, shrink decision time frames, minimize exposure to hazardous conditions, decrease travel time and more. As just one example, a mobile offshore deepwater drilling rig may cost up to $1 million per day to operate. Equipping employees with wearable displays to help improve operations and prevent downtime could pay for the initiative in a matter of hours. Wearables can also be used to expedite workflows. For a specific task such as changing a pump seal, an employee using a wearable display could examine the pump, request a work permit to change a rusted seal, show the damage to a team member and be instantly granted permission to replace the seal.

Given the value proposition for enterprises, it is not surprising that industry analysts and other companies are predicting wearables will be big business. Gartner, Inc. forecasts that Google Glass™ and other smartglasses will make employees more efficient, adding more than $1 billion per year to company profits by 2017. And APX Labs, LLC, maker of smartglass software, estimates there are approximately 40 million deskless workers in the US alone who could benefit from wearables, spanning healthcare, manufacturing, retail/wholesale, government, construction, transportation, resources, utilities and other industries.
Choose the Right Wearable Device for the Job

Like most technologies, the wearables market is changing quickly, making it more difficult to understand the multitude of product offerings, capabilities and functionalities—as well as limitations of the various devices. Currently Google Inc. and Samsung Electronics Co. Ltd. have the media spotlight. However, we soon anticipate wearables announcements from other major hardware, software and mobile device companies as well as startups. Bottom line, it is vitally important for enterprises to select wearable display providers that can manufacture and support units over the long haul and at scale.

In addition, there are different types of wearable technologies and the choice for enterprises depends on the use case:

- **Monocular:** Google Glass™ is an example of a monocular display that provides at-a-glance information in the upper right-hand part of a wearer’s field of view. Through tapping the bezel and speaking commands, individuals can use Google Glass™ to search the Internet, take a picture, get directions, send a message, make a voice call and record a note. There are also other less-consumer-focused monocular displays available on the market.

  In an enterprise application, a monocular display might be better for a retail salesperson, who could help customers check inventory while accessing information about their previous purchases and preferences. Likewise, monocular displays could be useful for a package delivery worker, who needs to use her hands to lift boxes while following the item pickup and drop-off routes shown on a wearable screen to help optimize delivery time.

- **Immersive:** The Epson Moverio™ is an example of an immersive, truly augmented reality display with a much fuller visual field. Immersive displays may be better suited for manufacturing plant or shop floor environments, or for industries where workers need to identify parts or follow step-by-step instructions that can be enhanced through telestration.

  For example, construction workers could view blueprints or 3-D models to better understand the expectations for a finished building; and medical practitioners working in remote locations could practice telemedicine and collaborate with other health professionals, who could guide them through unfamiliar or complicated cases.

- **Wrist-worn:** The Samsung Galaxy Gear™ is an example of a wrist-worn display. Smartwatches have added benefits: they are strapped on and thus are harder to lose and less fragile than with a tablet, and notifications are easier to spot than with a smartphone that is stashed in a purse or back pocket.

Enterprises can cost-effectively use wrist-worn wearables in a range of environments, including industrial areas such as mines or construction zones to provide safety alarms and location-based alerts; in the hospitality industry as a quiet alternative to walkie-talkies; and for outdoor environments where waterproof displays are a requirement.

Innovate with Wearables in the Workplace

Wearable technologies have a clear potential to disrupt every industry—including oil and gas, healthcare, media, retail, public service, warehouse, agriculture, construction and automotive—and also change how certain employees perform their jobs. (For illuminating examples of what is possible, see “Wearables Can Transform Work Processes across Multiple Industries” sidebar.)

One universal option is video collaboration to enable “see-what-I-see” coaching. For instance, newly trained service technicians could contact their supervisor remotely to confirm how to fix a problem on the first visit to a customer’s home, thus helping maintain customer satisfaction levels. Similarly, in a public service example, firefighters preparing to enter a building could use wearable displays to connect to the fire chief outside, who could then see through the firefighter’s field of vision to provide support or draw attention to a particular issue.

Another promising use of wearables is to speed the decision-making process at all levels. For instance, manufacturing companies could provide immersive wearable displays to shop floor workers. As employees checked the machines, data could appear in the field of view. If a machine indicated a red status, an employee could access the machine schematic, pick up tools and fix the machine by following a step-by-step guide. As needed, the shop floor employee could also contact a supervisor for advice, who could then draw on the diagram using telestration.
Accenture Puts Wearables to Work for Clients

Accenture has helped the following clients build proofs of concepts and pilots:

**Koninklijke Philips N.V.**—In 2013, Philips, a global leader in medical testing and patient monitors, requested a workshop on ways to integrate its healthcare software with an early-stage Google Glass™ device and use it in existing processes. Accenture helped validate the technical feasibility, and then build a demonstration to illustrate how Google Glass™ can be used in the operating room. For example, surgeons can check the display to get updates on a patient’s vital signs while still looking directly at the patient. Philips and Accenture also posted a video promoting the possibilities.

**Global oil and gas company**—This longtime client asked Accenture to help determine ways in which wearables could save costs in existing processes. Accenture conducted interviews with employees from around the world, gleaned 14 initial use cases and built business cases for the top three. From these business cases, with cost savings, helped improve safety and work efficiency that could bring as much as $200 million in benefits. To help verify that the client would be testing the right devices, Accenture evaluated more than 20 wearable displays for maturity and scale. As a next step, Accenture proved the concept and technical capabilities of Google Glass™ and the Epson Moverio™ on the APX Labs Skylight platform. Accenture continues to work with this client to help mature use of wearable displays within their business.

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**Patient Information**

- **Weight**: 68.2 kg
- **Height**: 1.701 m
- **Gender**: Female
- **Dilution**: 70 mg/ml
Enterprises should evaluate the kinds of information that wearable displays can collect and how to ingest, process and maximize the value of the data.
Adapt to the Wearable Form Factor

The possible ways for enterprises to weave wearable displays into the daily lives of employees are not only exciting but also highly lucrative. In order to move ahead, enterprises must plan for several key considerations, including:

- **User interface and experience**—Human factors become extremely important with wearables; the smaller display puts even more emphasis on the importance of perfecting the interaction model. Think about factors such as working environment, ergonomics and impact resistance. Ideally, wearables should empower employees to pull relevant information that they need and want to perform their job more effectively--not push information to them. It will also be important to get the context 100 percent right.

Enterprises also need to conduct careful experimentation and figure out how to prevent employee distraction, especially in industries that are concerned about safety. Training will be critical.

Battery life is another issue. Current models offer hours of occasional use and up to 45 minutes of continual use before requiring a recharge. Enterprise workers will likely need longer access for extended video conferencing or for instructions on how to repair equipment. Enterprises can help address this by using battery hibernation and additional battery packs, turning off chip sets when not in use, disabling Wi-Fi connections in certain areas, or employing geofences to regulate usage in sensitive areas.

- **Business process modifications**—Enterprises have to rethink how business processes can be optimized through wearable technologies and how employee workflows will change. Questions to address when redesigning work flows to help improve adoption including the following: What does a worker need to do a job? How do wearables fit into the actions they are already doing and make them faster, safer or more effective? How can wearables improve employee engagement and productivity by simplifying tasks? What systems or information do specific employee functions or roles need to access? Is there a way to make wearables part of the uniform, such as immersive display safety glasses for a chemist?

- **IT infrastructure**—From a technical perspective, wearable displays should be construed as a new presentation layer. Although the device and screen size are different from tablets, smartphones or desktops, enterprises will still need to write application programming interfaces (APIs) and integrate wearables with ERP, CRM and work order management systems. It is important to note that some wearables manufacturers have fairly closed platforms for development; others are more flexible and open. Companies will also need to determine the enterprise manageability of the apps deployed to the wearables, similar to the existing challenge facing CIOs with bring-your-own-device (BYOD) programs.

- **Data analytics and visualization**—Enterprises should evaluate the kinds of information that wearable displays can collect and how to ingest, process and maximize the value of the data. For example, employees could transmit video from the wearable to a cloud-based storage facility for review and archiving. Enterprises could also build a web portal for a holistic view of the data that workers consume, such as maintenance books, customer profiles or health records.

In addition, wearables can be used as a more passive data collection device. Field workers could automatically collect data about their environment, such as air temperature, air quality or sound level to help companies make quicker decisions or protect their employees, such as an instant alert if a gas leak occurred near where a utility worker was stationed. Wearables even have the potential to monitor employee biometric vitals, such as helping determine whether a pilot has gotten enough sleep before she flies an airplane or whether an employee in the welding line needs medical attention based on a sudden spike in his heart rate.

- **Privacy and security**—New technology tends to breed concerns about privacy, and wearables are no exception. However, we believe this is a bigger concern in the consumer market since employees are used to being monitored to some degree. For example, a telecommunication worker using a wearable display while climbing a telephone pole will be less resistant to the device if it provides the information he needs, when he needs it.

Enterprises should also understand the privacy risks that wearables introduce and adjust the data privacy policies for usage and integration when in corporate boundaries. Wearable technologies could capture information related to people’s habits, behavior and health, as well as enterprise information that could be deemed intellectual property. Geofences can also be utilized to disable the display in off-limits places, such as bathrooms, research and development labs or other areas.

Security is another concern, and companies should expand corporate security measures to cover wearables, which can be thought of as mobile devices at the edge. As just one example, it is important to protect against data leaks when the device is connected to the corporate network or managed by the BYOD corporate environment.
Enterprises can begin by looking for appropriate use cases within their business that take advantage of the wearable form factor. A good starting point is tasks that consistently require deskless employees to work with their hands while referring to various data sources. It is important to test hypotheses of how the wearable display usage trumps existing tablet, smartphone or desktop applications in terms of feasibility, ease of implementation, impact and cost savings.

Next, enterprises should evaluate which type of wearable display best solves the business problem instead of jumping to conclusions about the one to implement. It is important to build a demonstration and test assumptions with a few passionate stakeholders. Top companies will experiment with what works and what does not, and then learn and iterate quickly.

These proofs of concepts and pilots should factor in the key considerations above (user interface and experience, distraction, ergonomics, business process modification, IT infrastructure, data analytics and visualization, privacy/security) to ensure a complete and viable solution from the employee experience to the back-end systems, whether on the company’s premises or in the cloud.

Finally, enterprises should launch and scale the wearables solutions that deliver the best outcomes across the business. This effort may include allocating budget for wearables, such as hardware and application development; establishing governance across the business to ensure continuity; retraining staff to handle management of wearable devices and applications; hiring wearables expertise as needed; and leveraging external experts to develop or implement these strategies.

With these steps, you can put wearables to work in your enterprise now—for high performance today and well into the future.
## Five Myths and Realities of Wearable Technologies

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<thead>
<tr>
<th>Myth</th>
<th>Reality</th>
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<tr>
<td>1. Wearable displays are basically a combination of a smartphone and glasses.</td>
<td>Wearable displays enhance the functionality of a smartphone by presenting it in a more useful, timely and relevant manner. They are especially helpful for “deskless” employees who need access to real-time data while keeping their hands free to do work.</td>
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<td>2. Consumers will quickly embrace wearable displays.</td>
<td>The value proposition for enterprises is stronger and more immediate. Changing consumer behavior and integrating wearables into consumer lifestyles will take time.</td>
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<td>3. Wearable displays are stand-alone products.</td>
<td>Enterprises will need to weave wearables into a broader ecosystem of devices, services and applications and then manage them accordingly.</td>
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<td>4. Power consumption, batteries and Wi-Fi connectivity will not be big issues.</td>
<td>Availability and affordability of high-powered, long-lasting batteries require employees to use wearable displays only as needed or swap devices partway through a shift.</td>
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<td>5. Wearable devices are secure.</td>
<td>Enterprises will need to proactively address security, data privacy and legal implications of wearables just as they would any other mobile device.</td>
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Wearables Can Transform Work Processes across Multiple Industries

Wearable displays stand to benefit all types of deskless or highly skilled workers who need to:

• Access real-time data.
• Collaborate, share or retrieve knowledge.
• Collect and provide visual feedback about their working environment.
• Use their hands to perform day-to-day duties.

Here are some ways in which wearable displays could transform the future of work.

Oil & Gas

Drilling engineers—Enable real-time video feedback to/from the control room and an understanding of execution against the drill plan.

All staff—Use in conjunction with other safety measures to notify employees about emergencies or hazardous working conditions. Send new-joiners safety tips and best practices learned during orientation.

Manufacturing

Floor technicians—Provide machine tool information: power status, running processes/programs, alarms, messages and more. Allow technicians to view and stream real-time video footage of machines to experts, communicate with engineers, and record and share notes.

Process engineers—Enable remote troubleshooting and instruction for urgent needs. Provide ability to adjust process recipes and make specialty maintenance repairs through technicians and collaboration with others.

Retail

Floor salespeople—Enable a quick visual reference for how a retail display should be arranged as well as provide updated instruction regarding tasks (e.g., stock items, switch signs) and the ability to share finished work with a remote supervisor. Act as a guide for a customer to any specific section or shelf within a store, as well as how to operate a particular product.

Retail managers—Provide direct and efficient communication without intruding on or hindering employees’ tasks (e.g., folding clothes, stocking shelves).

Delivery and Logistics

Package deliverers—Scan packages, confirm delivery information and update shipping status using voice, leaving hands free to carry packages.

Warehouse staff—Keep hands free while using equipment, inventorying and sorting packages, and updating shipping status.

Healthcare

Surgeons, doctors, nurses—Help prepare for surgery for incoming patients by receiving live updates (e.g., voice/text/video notes, patient vitals) from paramedics. View patient vitals and relevant information during surgery through voice commands without looking away. Help doctors look up patient records and dosing guides.

Dental hygienists—Enable reference to past health records, such as the date of a cleaning or the results of an X-ray while still interacting with patients and tools.

Telecommunications field engineers—Enable employees working in high-risk work environments (e.g., at the top of telephone poles) to keep their hands free while still referencing work orders and using tools.

Construction

Construction staff—Allow access to the work plan in real time without having to put down tools; augment safety precautions for known hazardous areas or situations. Enable machine operations to accurately measure and cut materials or direct equipment along specified GPS coordinates.

Real Estate

Brokers—Allow quick reference to historical sales information, share property details with clients and provide virtual tours with voice commentary.

Emergency Personnel

Police—Enable access to criminal histories, license plate readers and location of backups during pursuit; provide opportunity to scan a suspect’s face and reference a database for matches when making an arrest. Support full documentation of dispute resolution, which can prevent false accusations and fraudulent law suits and help ensure proper law enforcement conduct.

Firefighters—Display building schematics or blueprints, automatically monitor oxygen levels, and help captain coordinate efforts of team and evacuation routes. Provide forest firefighters with access to topography maps.
About Accenture Technology Labs

Accenture Technology Labs, the dedicated technology research and development (R&D) organization within Accenture, has been turning technology innovation into business results for more than 20 years. Our R&D team explores new and emerging technologies to create a vision of how technology will shape the future and invent the next wave of cutting-edge business solutions. Working closely with Accenture’s global network of specialists, Accenture Technology Labs helps clients innovate to achieve high performance. The labs are located in Silicon Valley, California; Sophia Antipolis, France; Arlington, Virginia; Beijing, China; and Bangalore, India. For more information, please visit www.accenture.com/technologylabs.

About Accenture

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