

WEARABLE TECHNOLOGY BY INDUSTRY

BRAINXCHANGE / WHITEPAPERS

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INTRODUCTION

Wearable technology is a market loaded with promise. To date, that promise has been discussed more in the consumer realm, especially given the much publicized proliferation of first- (and now second-) generation activity trackers, smartwatches, bands, glasses, and other gadgets. But there is an emerging market for wearable tech that has even more potential. In fact, some experts believe the true potential of wearables – the future of these ***odd yet intriguing, hands-free*** devices – lies in business & industry.



But wearable tech has only just begun its impact in the enterprise. Those hoping to remain competitive, ***no matter from which industry they hail***, will certainly need to prepare for this next wave of mobile technology.

With recent and impending launches of some much hyped-about devices, including the Apple Watch, Microsoft HoloLens, Oculus Rift, and even Google Glass 2.0 – all promising significant advantages to the enterprise – it looks as though organizations will soon have access to wearable tech that will completely transform the workplace, ***from back-end operations to employer-employee relations and customer service.***

This eBook takes a closer look at the wearable technology **applications, devices, obstacles, and use cases** within specific industries or verticals. Reports indicate that enterprise will more than likely lead the mass adoption of wearables in the next several years. Thus, it is imperative for industry professionals to understand both the opportunities and challenges of this technology, in order to ***get ahead of the curve, improve their business, and capitalize on “first mover advantage.”***

HEALTHCARE & MEDICAL

Medical applications are one of the *main drivers* of wearables in the enterprise space. Wearable tech comes into play in this field in 3 ways:

1) There are wearable devices **worn by healthcare providers**. For example, doctors at Beth Israel Deaconess Medical Center in Boston wear Google Glass to communicate and check patient information.



2) Then, there are wearable medical devices for **managing chronic diseases** and for **monitoring patients post-hospitalization**, including wearable glucose monitors, ECG monitors, pulse oximeters, and blood pressure monitors. These can be used, of course, in hospitals but are also worn by patients – either purchased by them through their insurance or provided by a doctor – with the doctor having access to the data via a smartphone or tablet.

3) The last category comprises wearable devices for **health-related uses**, such as sports and fitness trackers. These can affect health insurance rates and users or wearers can also grant their health providers with access to the aggregate data.

DEVICES:

Smart glasses such as Google Glass and Epson Moverio and also Smart Badges like Hygreen's and Biovigil's hand hygiene monitoring systems for hospitals are used primarily by **healthcare providers**.

Other devices – smart clothing, smart patches, wearable monitors, fitness trackers, ingestibles, etc. – are worn by **healthcare recipients**.

APPLICATIONS & BENEFITS:

Wearables stand to function in healthcare & medical scenarios in a number of ways, including improving access to patient data and remote monitoring of patients with chronic diseases.

Pre-care applications allow doctors and patients to treat potential problems before they become more serious, and thereby reduce costs.

Wearable tech can also assist in monitoring patients post-care—for example, in tracking a patient's recovery process post-hospitalization. Again, this would cut costs.

Wearable tech can make routine medical procedures more efficient, including detecting a patient's veins for drawing blood, as well as facilitate telemedicine, remote expert consultations, and remote medical training.

CHALLENGES:

Compliance with regulatory agencies & privacy issues constitute two of the **major obstacles** to implementing wearable technology in medical settings. Medical institutions, perhaps more than any other enterprise organization, face seemingly insurmountable **privacy obstacles**—most obviously, the Health Information Patient Privacy Act or HIPPA.

In order for wearable technology with live-streaming capabilities such as Google Glass to be used in a medical setting, the device would have to run over a healthcare-specific, password-protected, encrypted network; otherwise, HIPPA laws will have to change considerably to accommodate wearables.

NOTEWORTHY USE CASES

UC Irvine Health: Using smartglasses to live stream and monitor residents' procedures.

Yale-New Haven Health System: Using smartglasses to better evaluate the patient experience.

Rhode Island Hospital: Using smartglasses in the emergency department to live stream images of a patient's medical condition to a remote specialist/consultant.

Seattle Children's Hospital: Using wearable devices that attach directly to patients' bodies to measure blood pressure, blood sugar, and heart rate.

Desert Valley Medical Center: Using wearable Leaf Patient Monitor in the hospital's emergency department to enable clinical staff to better monitor and observe patients.

Beth Israel Deaconess Medical Center: Using smartglasses to access patient records via a QR code displayed outside each patient's room.

RETAIL & WHOLESALE

Many analysts predict that the main beneficiaries of wearable tech will be those businesses that routinely involve *deskless workers* performing task-based activities. Retail is a great example—large store environments as well as wholesale warehouses are very mobile and task-driven, and could greatly benefit from wearables to increase efficiency in a range of activities, from receiving inbound deliveries and restocking shelves behind the scenes to creating an enhanced, seamless shopping experience on the consumer front.

APPLICATIONS:

Some of the proposed applications bank on shoppers owning their own wearable tech devices. Retailers could then create wearable apps, and send special, targeted offers to connected consumer devices while in the store. Other discussed “applications” focus on how retailers will need to carry wearable tech products for consumers to buy. But there is even more immediate potential in ***back-end applications*** when it comes to WT in retail & wholesale.

Wearables have the potential to improve the in-store customer experience not just by upending point of sale processes and providing more relevant (targeted) access to offers and deals, but also by changing how retail employees do their jobs. Wearable tech can enable workers to access information on-the-go, without having to visit a computer terminal or “go in the back.” This saves time, thereby boosting efficiency and productivity, and also prevents a sales associate from ever having to leave the customer’s side during the sales cycle. By connecting employees to all of a retailer’s digital resources in one device, wearables can create better, more informed customer service, and a more ***seamless retail experience*** for all. This means smoother sales, less wait time for customers, and increased staff productivity all around.

Wearables could also be employed for training purposes and tracking performance of sales or warehouse floor staff. Training exercises along with everyday task-based instructions could be deployed via a smartwatch, for example; and ***data analytics*** from wearable trackers could be used to make real changes in the workplace, by capitalizing on the harnessed behavioral info.



BENEFITS:

In a very general sense, wearable tech stands to usher in a new era of retail by facilitating greater ease of communication across all touch points in a single company along with stronger employee performance support. For instance, smartglasses supporting augmented reality capabilities can conceivably increase efficiency in store inventory management, effectively train staff, and increase process compliance in a warehouse.

DEVICES:

Currently, the devices being explored include wearable stock scanners, wireless headsets, and digital lanyards; smartwatches and various wrist displays; and smartglasses.

CHALLENGES:

There are several obstacles to overcome before these gadgets will go mainstream in the retail world, the most fundamental being tradition itself. Not only is retail historically slow to the game when it comes to seizing upon new technology, but retailers are also very capital constrained and usually weary of major investments in tech targeted towards employees. There needs to be some maturity as far as the cost of the hardware and form factor in order for retailers to more strongly consider arming their employees with wearable technology.

Battery life is another challenge; currently, most devices are not capable of lasting through an entire retail or warehouse shift. But perhaps the biggest issue holding wearables back from having a truly significant impact in retail is the difficulty in unlocking the value of the data. It is not clear at the moment just what to make of the data collected by wearables or how to put it to use. In other words, it is difficult to access the data in a meaningful way that might lead to key changes or improvements in an organization (in structure, process, workforce, etc.).

RETAIL USER SPOTLIGHT

Total Wine & More

Using Theatro's Wearable Computer—a hands-free, voice-driven device that dispenses the need for headsets or walkie talkies. The wearable can track sales staff, improve in-store (or warehouse) communication, and provide management with valuable performance data.



TRAVEL & HOSPITALITY

As in retail, much of the discussion when it comes to wearable technology in travel & hospitality has focused on how it stands to change the travel experience for consumers (i.e. the travelers) as opposed to those who work in the industry. For example, smartwatches (or smartglasses) can provide all the information that fuels a person's trip – flight and boarding pass reminders, gate updates, reservation numbers, confirmation codes, directions from the airport, transportation options, even restaurant recommendations and weather forecasts – all at a glance, all in real time, right there on the wrist (or in front of the eyes).



APPLICATIONS:

The applications for this sector are not quite as dynamic as compared to, say, logistics or construction, yet wearables stand to fundamentally change this industry as much as any other. Wearable tech comes into play here in one of two ways:

- 1) Employees can don wearable devices in order to enhance, speed up and improve the customer experience, as did agents of Virgin Atlantic at London's Heathrow Airport.
- 2) Travel & hospitality brands can engage with and assist their customers via consumer wearables (ex. a hotel booking app created for a smartwatch) or via specially designed devices like Disney's MagicBand.

BENEFITS:

So what can wearable technology do for the travel & hospitality industry? The main benefit seems to be improved customer service, or an *enhanced service experience*. Employees who utilize wearable tech can provide more efficient and personalized service to guests or passengers, while travel apps developed for consumer wearables will also contribute to a better customer experience. Companies will have to create such apps – real-time response apps for bookings, directions, and other *concierge-style* customer services – to continue reaching and engaging with modern travelers.

THE FUTURE:

Imagine arriving at your gate at the airport; the concierge checks his smartwatch, processes you seamlessly for your flight, while also providing you with real-time updates about the weather and local events in your destination city. On the plane, the inflight staff has already been made aware of your personal preferences, from dietary requirements to past beverage choices, via smartglasses; and a special blanket lights up red whenever you are in distress, prompting an attendant to come right over. Upon arriving at the hotel, the front desk clerk is wearing Google Glass armed with facial recognition software; she greets you by name and pulls up your reservation before you even reach the counter. It's no fantasy but an *imminent reality* thanks to wearable technology! Airport, airline, hotel and other travel & hospitality workers could even use wearable tech to translate and provide information to customers in a foreign language—hands-free and in real time, of course.



NOTEWORTHY USE CASES

Virgin Atlantic: Piloted a program at Heathrow Airport in which staff greeted first-class passengers with either Google Glass or a Sony Smartwatch. The devices delivered personal info about each traveler, enabling agents to provide a unique customer experience as well as efficiently process customers for their flight.

Walt Disney World Resort: Offers the MagicBand, which guests can use to enter parks & hotel rooms as well as make purchases. Disney is also using the aggregate data from the smartbands to create a more “magical” experience for its customers.

Westin Hotels: Launched a wearable tech program involving sleep-sensing wristbands to aid guests’ well-being.

Starwood: Developing apps for Google Glass & Apple Watch to allow guests to do everything from exploring & booking hotels to entering their rooms without a key.

Schiphol Airport: Trialed Google Glass for airport authority officers, who used the devices as a hands-free means of looking up gate & airplane information.

Vueling: Partnered with Sony to launch a wearable/smartwatch boarding pass.

British Airways: Experimented with a blanket that reflects passengers’ emotional state by subtly shifting colors, allowing for more responsive customer service.

PUBLIC SAFETY & SECURITY

When a building is on fire, every second counts for the first responders rushing to the scene. Technology that could potentially save time and limit distractions could save lives in this scenario. For example, smartglasses could feed important real-time, lifesaving information directly to the eyeline of a firefighter, without his having to take his attention off the critical task at hand to reach for a radio, smartphone, tablet or computer. For those entrusted with our safety and security, having both hands free – a well-known advantage of using wearable tech as opposed to handheld devices or computers – is not just convenient; **it's crucial**.



APPLICATIONS, DEVICES & POTENTIAL:

When it comes to police officers, firefighters, and paramedics, wearables are currently being tested to provide remote communication support and feedback; reliable visual and audio documentation in the field; increased safety; and better training.

Wearable devices can assist in field communications and improve situational awareness, allowing for more informed decision making in the field, while keeping first responders' hands free to deal with multiple issues at once. Imagine a paramedic tending to a patient while recording and transmitting information about her condition; or a firefighter searching for victims in a fire while simultaneously receiving insight allowing him to assess the best route to get to them (smartglasses).

Wearable cameras can be employed to document field procedures or protocol. The captured evidence could not only be used as proof in court, effectively protecting police officers (and firefighters) from negative legal ramifications of which they are undeserving; but it could also *protect the public* from police violence. Even more, the video could be leveraged as part of training, or to *augment* traditional police officer and firefighter training. Wearable tech can also track first responders' health vitals and environmental factors, increasing safety by providing early indicators of potentially hazardous situations.

Smartwatches also stand to impact emergency personnel by assisting with field communications and measuring one's health in the field via built-in heart rate monitors, pedometers, and various other sensors and apps designed to track exercise, sleep and stress levels.

CHALLENGES:

There are several major challenges to such applications, including finances: most fire departments, for instance, do not have the funding to upgrade to the latest technology. Also, there is the matter of privacy—currently of greatest debate, especially when it comes to wearable cameras. Any cameras used on duty must comply with established law and policy, such as the Freedom of Information Act and varying records retention schedules. As it is, all videos, pictures and audio recordings acquired by police have to be checked for people's faces, addresses, license plates, and other personal information before being released to the public. This is sensible, for in an age of social media where images and videos can “go viral,” precautions need to be taken. Police units and fire departments will have to review and strengthen existing policies before institutionalizing new, continuously recording technology like wearable cameras or smartglasses.

On top of posing a threat to privacy, the presence of a camera on scene could also change the *dynamics* of firefighting and police work, opening the door for some unintended consequences. Such technology adds an element of *self-consciousness* for both first responders and civilians. People's behavior naturally changes whenever a camera is introduced, and while this might encourage police officers to be extra vigilant, it could also provoke civilians to act dangerously during an emergency.

Another challenge is device durability, often referred to as “robustness.” How are manufacturers making wearable devices *field-proof* (ex. temperature-, weather-, chemical- or fire- proof)? Are hardware makers considering durability and other real-world, in-the-field factors? What about the fact that firefighters and police officers already have so much gear weighing them down? In its current form, for instance, Google Glass is incompatible with the standard firefighter oxygen mask: the device doesn't fit inside the mask and is also rather fragile, limiting its use to external personnel during a fire. As demand increases for wearable technology in the public sector, we will surely see more practical, rugged, and tailored form factors fit for use in a burning building, natural disaster or other chaotic emergency setting.

NOTEWORTHY USE CASES

MedEx Ambulance Service: Using smartglasses so that paramedics can send real-time footage from the moving ambulance, providing hospital doctors with critical visual information before a patient even arrives.

NYPD/LAPD: Testing wearables like Google Glass and body cameras.

ProTransport - 1: Using smartglasses with the aim of improving documentation and expanding medical consultative opportunities for patients en route.

CONSTRUCTION

According to sources, there are approximately 40 million deskless workers in the U.S. alone. Construction workers certainly count among this group, which stands to greatly benefit from wearable technology; but although construction is considered one of the major emerging markets for wearable tech, this sector has only just begun to dabble in the possibilities of wearables to increase safety and efficiency.

Considering that construction is one of the most dangerous occupations in the world, the case for wearables in the industry should be an easy one to make, right?

APPLICATIONS & BENEFITS:

In construction, wearables have the potential to improve field communication, efficiency, and safety.

Wearables can grant construction workers the ability to immediately and effectively capture, share and collaborate on jobsite information—all in real time and without having to use their hands. Wearables can also bridge time and distance constraints imposed by the remote nature of most construction projects; enable more informed, real-time decision making; and perform the duty of assessing jobsite safety accurately and continuously.

A huge benefit to employing wearable technology in construction is the ability to augment reality to access work plans before one's eyes, in real time, and without having to put down one's tools; and to view interactive models of building projects without having to be an expert at BIM (building information modeling) or VDC (virtual design and construction).

In addition, these devices can provide instruction, insight, and alerts to workers as they operate power tools, connect fasteners, and perform a variety of other tasks requiring concentration and the use of both hands.

Wearable tech can monitor construction workers' wellbeing as well as their proximity to danger zones, and augment safety precautions in known hazardous areas or situations.



Wearable tech will transform how those in the construction industry manage, view and collaborate on project information; and it will also revolutionize their approach to safety.

CHALLENGES:

The major challenges to WT going mainstream in construction are proving ROI and finding forward-thinking industry professionals to jumpstart a wave of conversion. Construction is an industry plagued by old rules; it's both very traditional and shaped largely by personal relationships. Most in the field don't feel they desperately need wearable tech to build something, nor are they too keen to abandon existing partners in favor of new technology solution providers, or to switch over to technology that their usual partners are not using. It has been a slow changeover as it is to utilizing tablets and drones, which is probably the most advanced tech in the space at the moment. Furthermore, construction is one of the only industries where efficiency has statistically declined with the introduction of new technology.

Another major issue for WT in construction is IT. Construction firms in general are rather behind in the world of IT, with many smaller firms lacking an IT department altogether; but as wearable tech continues to infiltrate the industry, becoming more integrated into not just the operations of construction companies but also those of their clients, we can expect to see an overhaul in construction IT methods.

DEVICES:

Smartglasses: document (camera), access visual projections, real-time scanning, and receive notifications.

Smartwatches: document (camera), real-time monitoring, safety alarms, and Location-based alerts.

Smart Hard Hats & Vests: measure distances, display architectural drawings, check the work being done against plans, and monitor workers' vitals.

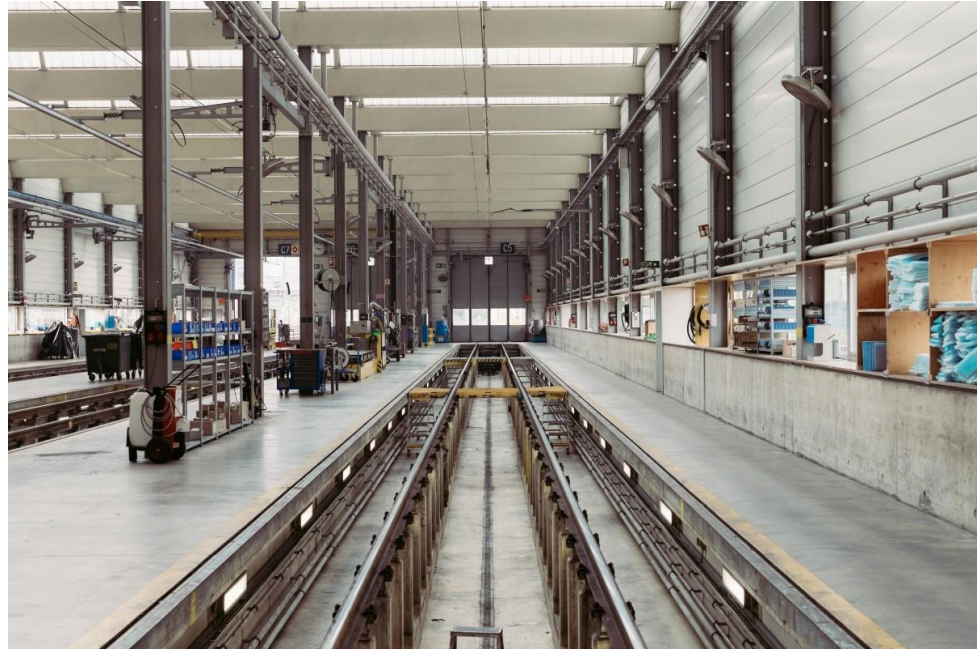
CONSTRUCTION USER SPOTLIGHT

Rogers-O'Brien Construction

This Dallas-based general contractor teamed up with software company Field Lens to use Google Glass on the jobsite for everything from quality control, to performing in-wall inspections and taking photos of lay-in ceiling, as well as for holding impromptu meetings in order to resolve issues while in the field. By using Glass to log issues and communicate in the field, Rogers-O'Brien has witnessed significant improvements in its construction operations, above and beyond what could be achieved via traditional mobile methods.

LOGISTICS

Wearables are not new to logistics; in fact, warehouse workers have been sporting wearable computers for years, including wrist scanners and headsets supplied mainly by Motorola. But now, we are seeing the next generation or phase of wearable technology emerging in the warehouse: the combination of smartglasses plus augmented reality is leaving the old, basic voice command system and wearable scanner in the dust, helping workers to multitask and do their jobs better like never before. Companies are always looking for new ways to drive down costs and boost performance and wearables might just be one of the more effective ways to achieve this.



APPLICATIONS & BENEFITS:

Wearable devices can serve as a guiding tool, providing hands-free instruction to increase speed, productivity, safety, and accuracy in a range of task-driven activities/processes, including order picking, packing, dispatching, and replenishment. And going paperless by sending orders directly to workers' smartglasses (instead of having to print, sign and bind them) does more than just save time and paper; it also leads to greater efficiency and fewer errors. Just imagine the alternative: having to constantly look down at printed orders or repeatedly picking up and putting down a handheld device. Not only does this slow down the workforce (and overall warehouse operations) but it makes it impossible to stay focused on the task at hand.

Along with providing greater accessibility to information and knowledge, wearables allow for greater flexibility and mobility in completing tasks; instead of having to hold a binder, tablet, laptop, smartphone or even radio, warehouse workers can gain access to and interact with real-time instruction and other rich data, visual displays or graphics, audio and video features, and even live remote expertise via smartglasses.

With wearable devices, management can visualize and monitor operations; anticipate and tackle problems that might affect productivity; and communicate and collaborate with workers in the process of completing tasks, all without having to be on the warehouse (or DC) floor.

Wearable tech can also be employed to track employees in an effort to ensure workers' health, safety, and productivity.

Combined with vision, voice, gesture, and touch controls or capabilities (depending on the device and application), wearables stand to aid in streamlining warehouse operations by minimizing touchpoints and generally improving efficiencies "across the board," from receiving to sorting, staging, palletizing, inventory management, replenishment, picking, packing, loading, shipping, and even quality control.

DEVICES:

As far as popular devices in logistics, smartglasses with AR overlays; wearable computers from Motorola Solutions/Zebra, including the HC1 Headset Computer and the RS419 Ring Scanner; and also wrist-worn devices are the most frequently profiled, trialed, and adopted. For a number of companies, voice-directed wearable solutions are a great entry point to improving picking speed.

CHALLENGES:

The adoption of wearable tech in logistics does not come without challenges, the most obvious being cost and implementation. Just consider outfitting an entire warehouse workforce with pricey wearable devices; it's just not feasible (or affordable) unless you have thoroughly tested the use case and can ensure ROI. Furthermore, there are concerns across all industries about whether current hardware offerings are truly ready for the enterprise, and the general consensus is that they're not. On top of battery life, a few other kinks have got to be worked out first. Logistics companies, for one, require a device that can be manufactured to scale, that works right out of the box, that lasts, and that is comfortable.

NOTEWORTHY USE CASES

DHL: Used a combination of smart glasses and augmented reality software in order to improve order picking in its warehousing operations. The technology allowed for real-time object recognition, barcode reading, indoor navigation, and seamless integration of information into DHL's WMS (warehouse management system). The company reported a 25% increase in efficiency during the picking process thanks to the wearable solution.

FedEx: Since 2000, parcel handlers have been equipped with scanning devices worn as a ring and used while loading vans.

Wynsors World of Shoes: Warehouse operators used ring scanners to surge through an average pick of 75,000 pairs of shoes per week.

UPS: Partnered with HP to create a wearable scanning and printing device that is saving the company millions by greatly improving productivity. The device accelerates the loading of packages into vehicles through the use of a hands-free imager and wireless terminal. Employees can more quickly and efficiently image barcodes than they could with traditional mobile equipment.

OIL & GAS

The energy industry is fraught with challenges today, including declining production rates coupled with increasing production costs; a lack of knowledge and expertise among young workers due to a retiring skilled workforce; and, of course, a host of complications associated with increasingly remote and dangerous mega projects. Is there potential for wearable technology to address some or all of these industry issues? Can wearables improve operational efficiencies; lead to significant cost savings; and/or make the dangerous, messy, and exceedingly complicated jobs in this sector safer and easier?



DEVICES:

When we talk about wearable tech in oil & gas, we are referring to wearable devices that can both collect and deliver data in the field, such as smartglasses and also VR (virtual reality) headsets. Other devices include smartwatches and other wrist and armbands, smart helmets, and sensors embedded in clothing designed to detect such things as radiation and/or chemicals. Most promising, however, is the smartglasses + AR (augmented reality) combo, along with the data analytics afforded by this new wave of mobile technology.

APPLICATIONS:

Wearables can cut down on response time and total working hours by...

- 1) Improving** communication between control staff and on-site workers
- 2) Providing** workers with the key information they need at the moment they need it, whether data, schematics, maps, guidelines, or instructions
- 3) Enabling** advanced, immersive, and remote collaboration, including virtual over-the-shoulder coaching; and
- 4) Boosting** on-the-job training—all hands-free.

Some more potential benefits/applications include:

Improving the safety and wellbeing of workers by heightening their situational awareness. Simplifying workers' daily operations in the field by delivering key information and remote support whenever and wherever needed.

Enhancing worker training by using VR headsets to prepare workers for both offshore and onshore rig environments. With smartglasses, specialists can also effortlessly record point-of-view video for new operators and trainees to review and consult in a hands-free fashion while in the field. AR also facilitates on-demand, on-site training, along with integrating training into production (whereas traditional training tends to interrupt operations). Indeed, wearable tech may be the answer to the serious shortage of skilled labor in oilfields, as well as a means of reducing training costs.

Using smartglasses with built-in AR software for equipment maintenance and troubleshooting: Rather than look at diagrams as one would in the traditional mobile or even 3-ring binder approach, the wearable tech combo allows field workers and engineers to interact with 3-D models to gain a better understanding of the equipment. AR anchors information when and where workers need it by superimposing text and imagery over the user's view of the real world.

Eliminating the need for rework, increasing response time, and diminishing downtime = major cost savings. Real-time facilities, equipment, workforce and environment monitoring + real-time performance metrics. Assistance in incident investigations by documenting & reconstructing events.

CHALLENGES:

Energy is an industry drowning in data and active in scattered, remote locations; while many industry executives recognize the transformational potential of new technology such as wearable devices, they are hesitant to adopt this tech. It may seem strange that in an industry thought to be very high-tech, professionals are slow to adapt the latest technologies to the oilfield, but this is generally the case with technology that originates in the consumer space. Then there is the "robustness" of currently available wearable devices. From a safety and practicality standpoint, manufacturers catering to this sector will have to consider such issues as sturdiness in the field and interference with other equipment; they will have to consult the oil & gas standards for equipment, and alter their products to meet those standards. As of now, most wearables are not quite ready to be introduced onto a rig site; they're just not rugged enough.

NOTEWORTHY USE CASES

Schlumberger: Using smartglasses to provide the hands-free intelligence needed to increase safety & efficiency among oilfield workers.

Baker Hughes: Testing a wearable that monitors workers' vitals and can send out a "man down" alert.

Marathon Petroleum: Developed the "Life Safety Solution," a wearable monitoring system that detects multiple types of potentially hazardous gas, and features a panic button, motion sensor, and GPS mechanism.