The Factory of the Future

How The Connected Worker Will Revolutionize The Factory
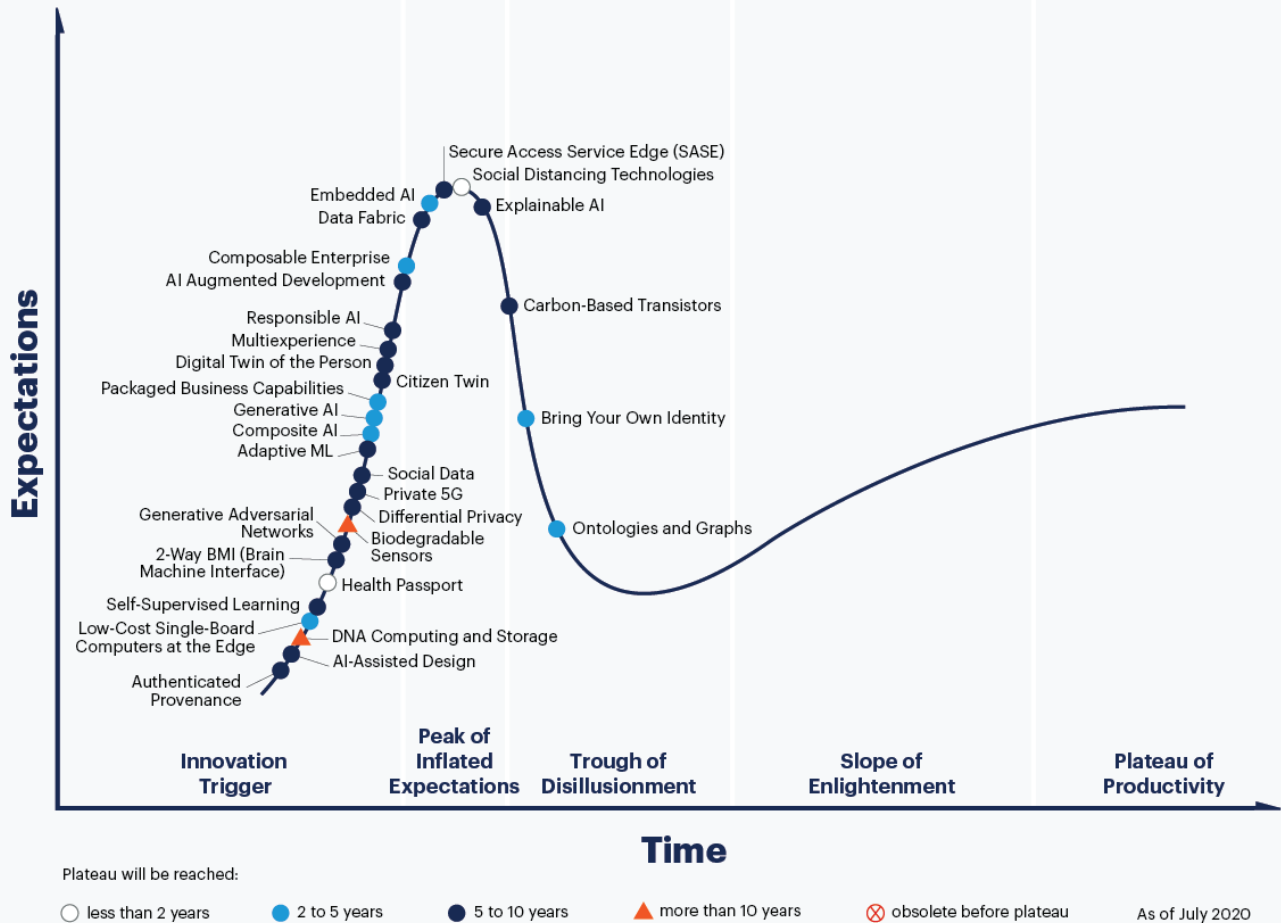
THE REALITY OF THE FACTORY OF THE FUTURE

Over the past several years, manufacturers have implemented consecutive waves of connected worker technology as a part of digital transformation efforts. While the hype has recently surged with the uptrend of digitalization, only a few businesses have fully transformed. The truth is that though connected worker programs stand to change how manufacturing companies operate, they need a bridge technology adapted to the unique needs of the factory enterprise and its workers.

When ruggedized tablets, immersive virtual reality (VR) and augmented reality (AR) solutions were first launched, they were all the rage, and manufacturers experimented with them widely between 2014 and 2016 in initiatives designed to bring workers into the digital future. Industry experts made all sorts of marketing claims and predictions about their potential to rapidly change how industrial workers complete their tasks and the value the emerging technologies would bring to organizations. At the time, more than one-third of manufacturers said they were either currently adopting or planning to adopt VR and AR technologies in the next three years.[1]

Hype Cycle for Emerging Technologies, 2020

Expectations

- Secure Access Service Edge (SASE)
- Social Distancing Technologies
- Embedded AI
- Data Fabric
- Explainable AI
- Composable Enterprise
- AI Augmented Development
- Carbon-Based Transistors
- Responsible AI
- Multiexperience
- Digital Twin of the Person
- Citizen Twin
- Packaged Business Capabilities
- Generative AI
- Composite AI
- Adaptive ML
- Bring Your Own Identity
- Social Data
- Private 5G
- Generative Adversarial Networks
- Differential Privacy
- Biodegradable Sensors
- 2-Way BMI (Brain Machine Interface)
- Ontologies and Graphs
- Self-Supervised Learning
- Health Passport
- Low-Cost Single-Board Computers at the Edge
- DNA Computing and Storage
- AI-Assisted Design
- Authenticated Provenance

| Innovation Trigger | Peak of Inflated Expectations | Trough of Disillusionment | Slope of Enlightenment | Plateau of Productivity |

Time

Plateau will be reached:

- ○ less than 2 years
- ● 2 to 5 years
- ● 5 to 10 years
- ▲ more than 10 years
- ⊗ obsolete before plateau

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gartner.com/SmarterWithGartner

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> " **The pandemic has put the value proposition for AR front and center for users and IT buyers.** "
>
> TUONG HUY NGUYEN
> Principal research analyst, gartner [2]

Before we were hit by the COVID pandemic, the impact of these technologies didn't live up to early projections. Gartner estimated in 2018 that it would take another 5 to ten years before the technologies reached a mature level. However, the onset of the pandemic has changed the dynamics of new technology adoption and accelerated digital transformation.

"The pandemic has put the value proposition for AR front and center for users and IT buyers. You can help someone repair a piece of equipment when normally you would call and they would say, 'I'm on this jobsite, I won't be able to fly out there for another three days,' and my task gets put off for three days. Now, they can remotely dial you in, you can draw on my screen, show me how to do things and we're off and running," says Tuong Huy Nguyen, Principal Research Analyst, Gartner[2].

Though the COVID situation has manufacturers reconsidering AR and VR technologies for remote connectivity, they still experience adoption challenges in five key areas.

The low rate of adoption is due primarily to backlash from manufacturers in five key areas:

Non-hands-free backlash

Though ruggedized tablets typically use platforms familiar to workers and can be easy to use, the reality is that the majority of manufacturing employees work with their hands. Whether they're working on a production line, fixing a piece of equipment or inspecting product, the ability to work with their hands is integral to their job. To use ruggedized tablets in industrial environments, workers must take their hands and attention away from whatever they're doing.

In turn, this:

a) decreases worker productivity, because they have to pause an activity to look at the device (with lower productivity affecting the bottom line) and

b) decreases situational awareness, which is critical to being able to identify and respond to life-threatening safety hazards (which can also affect the bottom line).

Many immersive solutions that cover the face reduce peripheral vision and add to the digital distraction that workers, who already carry smartphones, have on the job. These solutions are simply better suited to the needs of architects and designers, who don't have the same rugged, hands-free needs as factory workers.

Fragility backlash

Many of the devices that have launched over the past several years weren't originally conceived and designed for a harsh industrial environment, where they may be banged up, dropped, exposed to dust, extreme temperatures, or used in other harsh conditions. They're consumer devices that have been marketed to manufacturing, but they weren't built from the ground up for use on a factory floor. Just look at the iPad:

Though the consumer version was launched in 2010, ruggedized iPads and other tablets weren't adopted at scale by more than 1,000 workers in a single manufacturing business until 2014. Consequently, enterprise and worker frustration alike has grown with the cost and ineffectiveness of device replacement and frequent repair.

Sunken cost backlash

Even with ruggedized mobile devices, the cost of device failure and malfunction in rough conditions contributes to the Total Cost of Ownership (TCO), which is not prioritized as much as the initial investment. On average, each incidence of device failure costs productivity loss of up to 70 minutes for each frontline worker[3]. In a post-pandemic economic climate of constrained budgets, finding the right mobile solution for the target application is vital.

App & content investment backlash

Most companies don't have the large quantities of immersive and interactive content needed to deliver Internet of Things (IoT) data visualization, maintenance instructions, training and reference materials on these devices. Creating libraries of this content or developing apps for thousands of pieces of equipment represents a large investment, and certain types of content, such as 3D, isn't really needed to enable remote coaching, knowledge transfer and viewing of documents and checklists.

Content is also not standardized between different devices – what works on one device typically doesn't work on another due to aspect ratio, frame rate, image quality and other factors, so unique content must be created for each device. That means manufacturers have had to go all-in on a particular device and, with new, unproven technology, that investment can be hard to justify.

Protective equipment backlash

Immersive solutions such as helmets or headsets that partially cover the face aren't compatible with safety glasses and other safety gear, and ruggedized tablets are hard to use or cannot be used with safety gloves. This makes the devices difficult or impossible to roll out to all workers.

A new approach is needed

Though COVID-driven technology adoption has shown that the potential benefits of these technologies are real, their real-world ability to make immediate change has been overhyped. The result: Manufacturers are unable to realize the benefits of enterprise-wide digital transformation, and deskless manufacturing employees on factory floors are disillusioned and resistant to implementation due to failed connected worker programs.

What's needed is a pragmatic approach to connected worker programs that's tailored to manufacturing and can deliver the digital transformation results the industry needs, instead of a futurist, technology-trying-to-find-a-problem approach. A technological steppingstone can help manufacturers achieve their digital transformation goals and realize massive ROI, productivity, safety and knowledge transfer benefits from their connected worker devices.

Identifying the right device

Identifying the right devices comes from an understanding that there isn't a "best device", but rather there's the right device for the job. The qualification process requires an understanding of the following:

Environment
What is the environment that the device will be used for?

- Does it require ATEX certification; is it outside, cold or loud?

User
What are the requirements of the user?

- Do they wear PPE or prescription glasses? Is safety a concern?

Job task & software
What does the job task require and is there software available to support this?

- Does the worker need to conduct a remote audit, or do they require remote assistance to troubleshoot in the field?

Head-mounted, voice-controlled wearable devices are crucial for deskless employees to work hands-free, keep their eyes on their job and better respond to safety issues and production errors. These devices are not only convenient but they are also designed for durability. A long battery life and drop- and dust-resistance are critical for tough environments. The technology must also be used unobtrusively with safety glasses, gloves and other equipment.

Wearable computers can also help manufacturers overcome the challenge of producing a large amount of content for digital transformation. These devices can repurpose existing content for training and safety, such as vendor or OEM instructional videos, safety checklists, PDFs, technical drawings and manuals. Some machines with touch panels or APIs can be swiftly turned into apps for use on wearable computers, allowing workers to control their production equipment and access IoT data while walking around the factory floor with just the use of their voice.

Wearable computers can have a front-facing camera that enables workers to quickly capture walk-through videos or instructional content that can be shared with other staff. The front-facing camera can also show a worker's field of vision to a remote expert, enabling swifter problem solving and training at the same time.

This technology presents a middle ground that can help manufacturers bridge the gap between their digital transformation goals and the realities of the factory floor. With solutions such as this in place, we predict that the factory of the future – and the technology used in it -- will look very different than it does today. Factories and corporate offices, multiple factories within a supply chain, and factories and their original equipment manufacturers (OEMs) will connect and create a network of data and content that generates a multiplier effect for ROI.

This is already playing out in the factory enterprise in a handful of ways:

- **Innovation is stabilizing, and a handful of wearable technology providers are emerging as leaders,** allowing manufacturers that are currently investing in reusable content to pull ahead as their large, existing content library sets them up for success on any platform.

- **Leasing or wearable-computers-as-a-service models are emerging** to enable manufacturers to overcome the rapid pace of technology change, lower the cost of wearable programs, maintain IT security and consistently innovate how they use technology on the factory floor.

- **Security is becoming seamless** as IT grows its experience in deployment of connected worker programs and wearable computers become an everyday technology for IT.

- **Factories are sharing best practices between facilities,** enabling manufacturers to leverage expertise from around the world and creating untold efficiencies as one factory site can train another in its processes.

- **Factories are troubleshooting equipment** as their entry point for wearable computers and then grow into other applications.

- **IoT point of interest visualization** is increasingly common for key pieces of equipment, allowing workers to instantaneously view data on key machinery while sharing information with factory supervisors, technicians and OEMs – resulting in reduced equipment downtime.

- **AR-led guided and preventative maintenance is becoming the preferred way to complete tasks,** allowing newer workers to take on more advanced tasks and reducing human error across the factory enterprise.

- **Factory leaders are providing remote factory floor tours** to key stakeholders, such as insurance underwriters, the FDA or federal regulators, saving costs and facility time.

- **Paper assets are being digitized,** enabling all types of factory floor workers to be trained faster and work with greater productivity and safety. Digital lab books and data capture will replace paper capture.

$72.8 Billion

Global spending that IDC forecasts for augmented reality and virtual reality by the year 2024.[4]

43.2 million units

of augmented reality glasses expected to ship in 2025 with a CAGR of 53.1% from 2020 to 2025.[5]

Overcoming Internal Resistance

Your manufacturing organization can achieve digital transformation and adopt connected worker programs with wearable computers. It's likely, however, that you will experience some internal resistance due to failed programs of the past. Here's how you can overcome organizational skepticism or individual resistance and realize the potential of a connected worker program:

Identify a real-world problem that can be solved

In the past, organizations often rolled out new technology without making a clear case for how the technology would change existing ways of working for the better, resulting in low adoption rates. Instead, start with a small group of frontline employees and work with them to identify a business problem or pain point that can be solved with wearable computers. Then, implement a well-designed pilot program aimed at solving that problem to uncover the challenges and results of the device use before broader rollout. This enables you to fine-tune the program. Because the program and its content will be customized to the specific needs of your workers, it will also drive a greater ROI and higher rates of adoption. Targeting a specific business case also makes it much easier to judge the ROI of the program.

Break down barriers early

Bring IT and environmental health and safety (EHS) partners onboard as early as possible in your connected worker program. They can help you understand organization-wide needs and how critical factors such as connectivity, device management, training, safety and usability will play a role in your deployment. Security reviews are often one of the biggest causes of delays of pilot programs, and by making IT a partner, you can address concerns early and turn IT into an advocate.

Keep it short

Your pilot program should last no longer than three months to avoid "pilot purgatory." Longer programs without demonstrated ROI tend to lose the attention of top management and workers alike. With the help of your IT and EHS partners, set specific success criteria and metrics around the business problem that your pilot is focused on. Once your pilot is complete, measure results and gather feedback to make your case for the connected worker program and identify any opportunities or improvement needed.

Set realistic expectations

Your pilot should be focused around a solving a single use case. Make sure that your pilot metrics are based on solving that one use case and align all partners and employees around the goals of the pilot. If the business problem you're trying to solve is too complex or employees don't understand which problem they are targeting, your partners may have unrealistically high expectations for the pilot's impact. Only once your initial pilot is complete should you add additional use cases.

Shift your culture by showing the devices in action

Lead by example and enable broad cultural change by showing your workers that the program has buy-in from top executives. The best way to do this is to use the devices themselves to communicate about the program with workers. HR and internal communications partners can help you successfully implement the devices for this use.

RealWear industrial strength assisted reality solutions

RealWear is enabling the factory of the future by creating solutions that are purpose built for industrial use. Our industrial strength, assisted reality wearable solutions engage, empower, and elevate the modern industrial worker to be more efficient and perform work tasks more safely, with precision. Designed to operate in remote, dusty, loud, complex, and sometimes hazardous environments, RealWear's assisted reality tools enable frontline workers to view and share documents, diagrams, photos, and video, all while keeping their hands and field of view free for the work.

Hands-free operation

RealWear delivers 100% hands-free solutions that allow industrial workers to intuitively navigate critical applications, documentation, and functions using simple voice commands, even in high-noise environments. The head-mounted device is fully compatible with PPE and provides a high-resolution micro display that sits just below the line of sight, views like a 7" tablet, and can be easily be moved out of the way when complete field of vision is needed to accomplish a task.

Ruggedized design

Designed with built-to-last technology, RealWear assisted reality solutions can be deployed in wet, dusty, hot, dangerous and loud environments with minimal risk of failure. They can withstand a fall of up to 2m without any damage or loss of functionality. With a failure rate of less than 2%, RealWear products are 4X less likely to fail than a rugged mobile computer and almost 13X less than a non-rugged mobile computer.[7]

Anytime, anywhere access

RealWear assisted reality solutions enables industrial workers to connect instantly with remote experts using real-time video collaboration. They save costs, reduce operational errors and equipment downtime by allowing frontline workers to easily verify and document tasks using the high-resolution camera to capture photos and videos even in hard-to-reach places.

Enterprise ready

RealWear solutions fully integrate with enterprise-class software, security protocols, and with a variety of device management solutions. Over 200 leading software providers have optimized solutions for the micro display and completely voice controlled navigation. With device commands and controls supported in 15 languages, RealWear solutions can be easily deployed using our global channel partner network.

Customer stories

Automotive leader digitally transforms Production plants with RealWear

With global presence, Hirschmann Automotive was looking for a cost-effective and time-efficient knowledge-transfer approach for maintaining and repairing equipment than flying experts around the world. Deploying RealWear running Cisco Webex Expert on Demand enabled Hirschmann Automotive to streamline collaboration and reduce equipment downtime.

Read on

A premium petcare provider boosts factory and Training efficiency with RealWear

The Global Mars Supply Excellence Team was tasked to streamline its production facilities, including minimizing maintenance downtime and increasing workers' skills and safety. The RealWear device running Microsoft Teams provided workers on the factory floor with safe, fast and hands-free access to equipment files and off-site coaching.

Read on

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